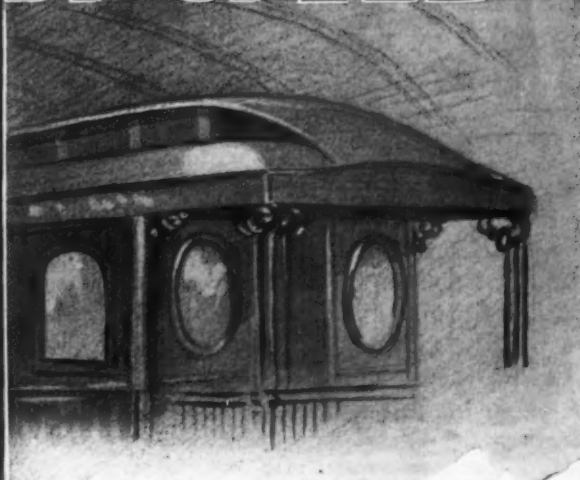


THE AUTOMOBILE

WORLD'S PROGRESS REGULATED BY SPEED

JACKSONVILLE
ATLANTA
INDIANAPOLIS
ELGIN
PHILADELPHIA
LONG ISLAND
SAVANNAH
AND ALL POINTS
SOUTH
AND
WEST



TRANSPORTATION'S highest expression so far in the history of man is the automobile. As a factor and exponent of speed the modern motor car is a long stride in advance of anything ever devised. It is still being developed and refined and the latest effort that is being made in the line of speed progression is represented in the project to conduct a Grand Circuit for automobile racers during the coming season.

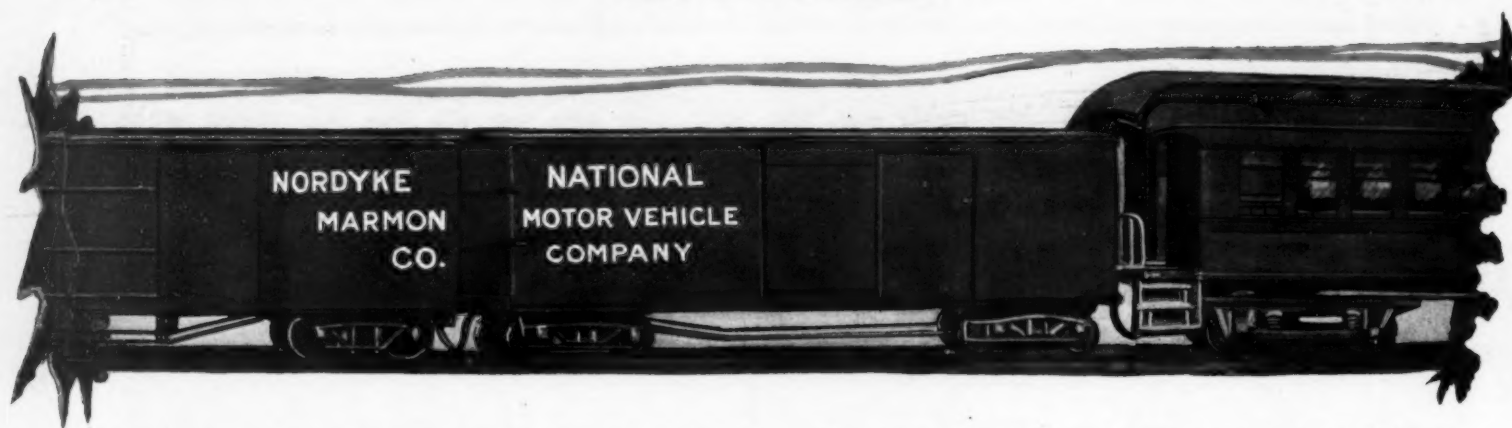
Less than 20 years ago the automobile was a shadowy dream. Ten years ago it was an expensive and uncertain toy and to-day it is the most striking evidence of practical advancement in transportation since the dawn of the world.

The world moves and anything that tends to make its motion faster saves time. Time is money and money is a broad term that means value. Progress has ever been measured in terms of speed. Therefore, the automobile as the concrete representation of high speed may be ranked among the most important developments of the world in this or any other age.

Undoubtedly the mere fact that an automobile can go at the rate of over 100 miles an hour is important as showing the state of the art, but it is vastly more important to the general public to know that bona fide stock cars are sufficiently staunch, swift and reliable to compete in racking speed trials.

It is spectacular and inspiring to see half a dozen specially constructed monsters whirl around a motordrome course, or shoot along road courses in competition, but such contests do not prove much as to the qualities of stock cars.

In the past there has always been a doubt in the public's mind



as to the status of the cars raced as stock models. Last year a determined effort was made to define the stock car and to enforce the spirit of the definition. A measure of success was secured and for the season that is about to open the lessons of last year and other seasons have been crystallized and a sporting plan of much scope has been outlined. Last Friday at Detroit, Chairman S. M. Butler of the Contest Board met with Howard Marmon, Howard E. Coffin and others to settle the details of the first automobile racing Grand Circuit ever attempted. Roughly and unofficially the plan adopted was about as follows:

A list consisting of some 23 or 24 race meetings, hill-climbs and road races of national importance was made up and tentative dates assigned to each. Then an itinerary was laid out commencing at Indianapolis, May 30, and extending to November 1 or thereabouts at Savannah.

Plans for a Special Train to Carry the Racers and Officials from Point to Point Discussed and Favorably Acted Upon and a List of Administrative Officers Nominated

The circuit will extend no further West than the Mississippi River vicinity this year, but it is intended to push it clear through to the Pacific Coast next year if success is met with.

Many of the leading American manufacturers have signified their willingness to take part in such a Grand Circuit enterprise and the next thing that will be done is to present a formal agreement to those who have expressed themselves favorably. It is estimated that 20 or more companies will participate. It is definitely announced by the Contest Board that the fact that a company does not take a car in the Grand Circuit train will not prevent that company from competing in any race event it may elect on an equal footing with those companies that have special quarters on the train.

When the meeting adjourned, the general opinion seemed to be that the project would be realized and that the signing up of the various companies would prove perfunctory.

The season outlined for the Grand Circuit will be five months long and will comprise at least four big road races; four speedway meetings; four or five national hill climbs and a dozen or more dirt track meets, an average of five meetings a month from the beginning to the end of the season.

The Contest Board with the endorsement of the Manufacturers' Contest Association will control the racing.

In order for a car to compete as a stock model the rules of the Contest Board will have to be observed with much particularity. Its manufacturer must submit definite car data to the Contest Board according to the rules that have been exclusively published in *THE AUTOMOBILE* in the issue of March 2. These provide in detail for every known contingency that might arise. In addition the factories are being inspected by the Technical Committee of the Board and when a car is presented for entry in any racing or reliability event or hill-climb, the technicians must examine it closely to determine that it checks up with the stock certificate that has been issued for the particular model.

One of the advantages of this procedure as far as the manufacturer is concerned is the fact that a complete list of cars for which stock certificates have been issued will be published by the Contest Board, thus affording the public the fullest opportunity to determine the status of contesting cars in stock events.

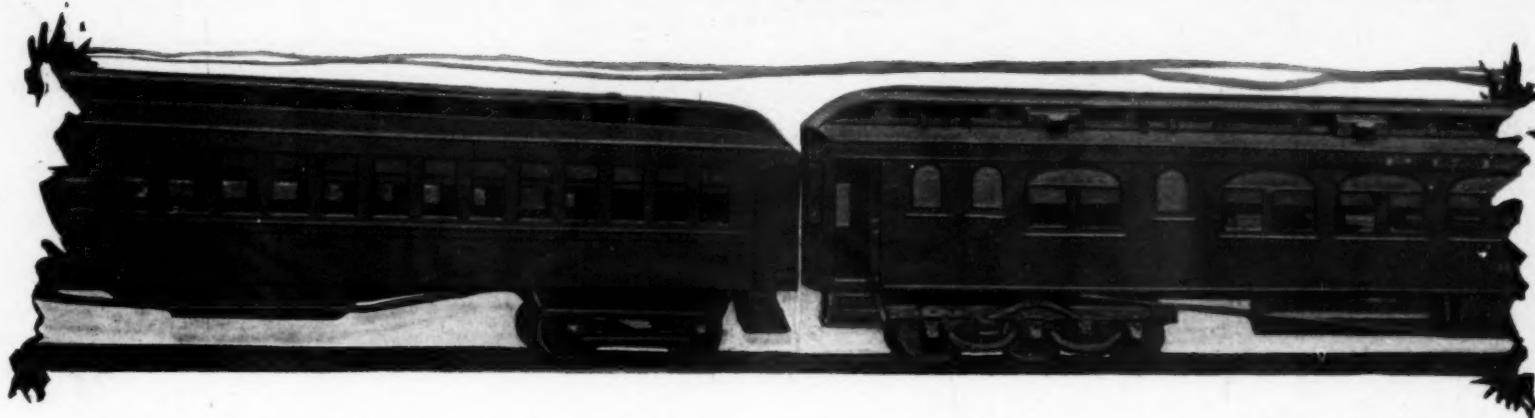
These lists will be distributed to the various motoring organizations of the country and copies of the certificates will be furnished to agents of the manufacturers to warrant them in entering competition where the companies do not care to do so. This, it is believed, will prove of some value to the agents in selling cars.

Like Every Other Human Enterprise, the Grand Circuit will Depend for Success Upon the Integrity, Ability and Industry of the Men who Handle the Project

While the Contest Board will have the final word to say about racing eligibility and other matters vital to the Grand Circuit, the business details as far as they concern the administration of the project will be handled by the circuit officials.

Some question has been raised as to the effect of the plan upon the promoters of race meets and other sporting contests. Chairman Butler says that the installation of the circuit system will have the effect of removing all worry from the minds of the promoters as far as a typical entry list of eligible cars and drivers is concerned. Instead of paying the bills incident to a race meeting in dribblets, as has been the case in the past, the





promoter will make his arrangements for a gross sum payment, which Chairman Butler says will prove to be a real money economy aside from the satisfaction that must follow competent professional handling of the events.

He says that the added interest of the public and the increased gate receipts will be a sure consequence of the larger and better balanced fields and businesslike handling.

From the viewpoint of the manufacturer he says that the circuit plan will be more economical than former racing schemes. The fact that the cars will have the chance of competing often under varying conditions at less cost than was necessary under previous plans, he maintains will be a big advantage. He points out that at the end of a season the records of all the contests held will give a better and more comprehensive idea of the stability and speed of the cars than ever before in the history of automobile development.

The Term Commerce is Defined as the Process by Which Human Wants are Fulfilled

All progress of the race has resulted from commerce. Transportation is the prime basis of trade and speed is the chief element of transportation.

In its most primitive form, commerce was simply hand-to-hand barter, but as man's wants grew with the development of commerce such as it was, in the earliest period of human life, some new means of transporting goods had to be devised.

Far back beyond any trace of written history, man traded with his fellows and the tribes interchanged their goods and profited by the interchange. Fossils in the living rock that date back nearly to the dawn of mankind's era, show that prehistoric man used weapons in some instances that had been made long distances from the place of his abode and death. The earliest traces scrawled by historic man tell the story of a commerce. It was likely only such a trade as could be conducted by the use of human burden-bearers.

Long before 6000 B. C. international trade had been established on considerable lines, the chief means of transportation being human bearers, pack-animals and rude wagons and, most important, water transportation.

In fact, the main element of commerce in the early times was by water. The radius in which the burden bearers were effective

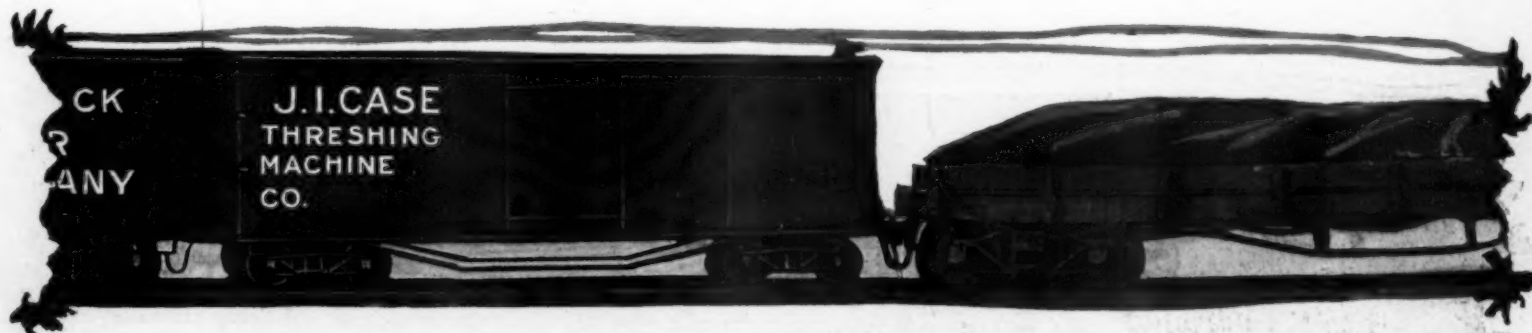
must necessarily have been small and that of the pack-animals and the wagons of that day but little larger. But with the water transportation it was different. The shipper of goods could embark a cargo upon a raft or rude boat and float it down stream for hundreds of miles, making the voyage in vastly less time and with less effort than it could have been made by bearers or pack-trains. With lighter boats and lesser loads the return trip also could be negotiated via the water courses. Primitive commerce of this kind brought industrial improvement, better food supply, clothing and shelter. It brought about more continuity of life and led to the practice of domestication of animals which was the forerunner of the pastoral ages of mankind. All the tribes and nations did not progress in the same measure, some retaining their savagery and roaming habits to a greater degree than others and thus the hunters and wanderers who were slower in developing really served a purpose in the primitive scheme of commerce by furnishing a variety and complementing the efforts of the herdsmen and first agriculturists.

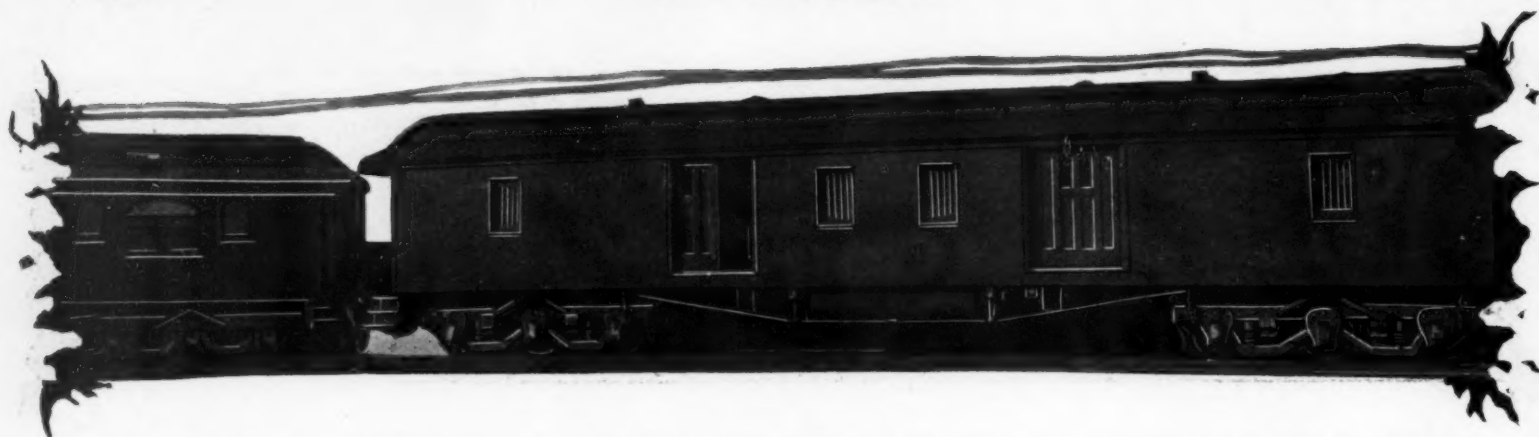
There was something of brigandage and piracy about early commercial dealings which has not been entirely eliminated even from modern practice, but in the first trading expeditions the idea of trade might be said to be secondary in importance.

At the period of development where there began to appear well-defined lines of commerce, it was noted that robber tribes soon took possession of the passes through which the traveled roads ran and took tribute of the traders with impartial hand. But despite these drawbacks, which may be laid to temperamental faults of man, prosperity and civilization made progress and the demands of trade worked broadly to spread the sway of peace and commerce.

The first professional traders of which there is any record were peddlers. They bought from producers of one section, paying either in some rude media of exchange or in the products of some other section. At first the latter was the invariable rule, but later the former became generally used. These peddlers usually banded themselves together in caravans of sufficient size to stand off the robbers in the mountain passes and it was only a comparatively short time until some of the tribes had developed a remarkable aptitude for this sort of business.

Packs carried upon the shoulders of these traders constituted the first freighting system of humanity. They also used the





water courses for considerable migrations and at the widest estimate, perhaps, covered several hundred miles in a year. The horse was not used in those early days as a pack animal. He was too wild and strong to be controlled by mere traders, and whatever purpose he served it was probable that it was small in a commercial way. Since the earliest days the horse has been the agent of war and the carrier of the soldier. But eventually even the proud horse had to bow his neck to the demands of commerce and in conjunction with the lowlier beasts of burden, he became one of the main dependences of land caravans.

The origin of the wheel is shrouded in the deepest historical shadow. The ancient Egyptians were skilled wheelwrights, and cuneiform inscriptions that date back before the beginning of Hebrew time describe wheeled vehicles in Mesopotamia. It is not likely that the carts antedated the use of the draft animal, and so it is reasonable to suppose that the use of wagons developed gradually from ruder practices in prehistoric times.

The Ancient Phoenicians Were the Original Advocates of Commerce

This nation was far and away the most important of the old Orient and before the dawn of history had developed much skill as sailors and fishermen on the Persian Gulf and had devoted much effort toward trading with the tribes that lived along that body of water. When they moved westward across Arabia to the Red Sea, and then drifted northward to the eastern coast of the Mediterranean Sea, they brought along their seagoing traditions and after establishing their cities of Tyre and Sidon, they explored and traded all over the Mediterranean, penetrated the Straits of Gibraltar and coasted along the Atlantic Ocean from the western side of the African continent to Great Britain and even farther north.

The Tyrians were strictly a maritime people and the aid they gave commerce stimulated the civilization of the world to a remarkable degree, even though to a large extent they only acted as intermediaries. Colonies of Phoenicians sprang up along the north coast of Africa and in many of the islands, and the idea of commerce was strongly implanted in virgin territory.

Wealth flowed into the coffers of Tyre and Sidon just as it had in the cases of Babylon, Nineveh and the great cities of Mesopotamia, the ruins of which only now are being brought to

light. With wealth came new desires for wealth and luxury until the limit of transportation had been reached and decline and decay set in. War was usually the direct active cause of national destruction in that day, but the seed of weakness had long been sown in apparently prosperous nations before the final blow was struck, and the element of weakness was nothing more nor less than the fact that the limit of transportation possibilities had been reached at a given period.

Road building was rudimentary in early times. It was not until the rise of the Roman nation that determined effort in the line of road making was taken up. Even then the Roman roads were built exclusively for military purposes. It was only after the general triumph of the Roman arms that it was found that the marvelous straight, smooth rock roads of the Cæsars were vastly more useful for peaceful trade than they were for military convenience.

At the dawn of the Roman era the chief methods of transport were by carrier, pack-train, cart and ships. Greece in her grandest day had nothing more, Egypt had even less and the ancient nations worked under the same disadvantages.

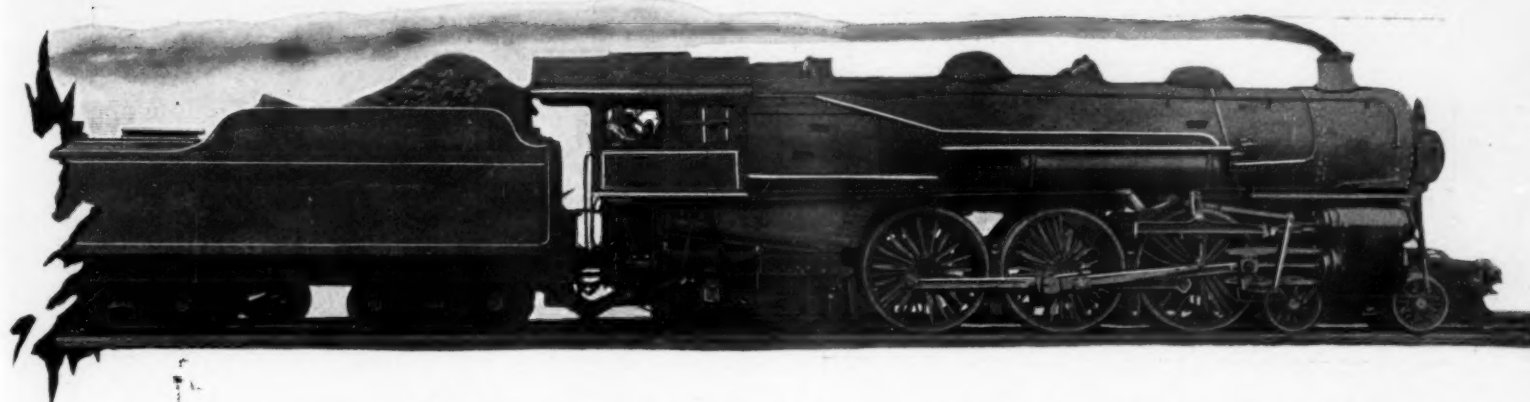
Rome gave the world a lesson in roadmaking, and in the exact measure of its success along that line did it exceed the grandeur and power and riches of any other nation of the Old World.

When Rome fell the swiftest mode of transportation was by means of horses by land and galleys by sea. The Romans were able to cover more ground because they had better roads than their predecessors, but as far as the means used were concerned, not a mite of progress had been made in ten centuries.

The horse of the Arabian deserts had been developed as an implement of war and sport. The chariot races of old Rome have yet to be equalled as sporting spectacles. The war chariots that formed the second line of military offense behind the legionaries were strongly built wheeled cars, somewhat similar to the racing chariots, but not so speedy. It was the improvement in roads rather than changes in methods of transport that made Rome great.

The civilization of the ancients, particularly that of the Persians, Phoenicians, Egyptians, Greeks and Romans, was of a high order in many ways, but was necessarily limited by the slowness, uncertainty and expense of transportation.





When Rome fell and the Dark Ages commenced near the end of the Fifth Century, human progress was checked short and until the use of gunpowder struck the shackles from humanity by overthrowing the mailed knight, there was not a gleam of hope for the world for almost 900 years. No advancement was made in means of communication between the nations save that the attention of the world reverted to water traffic. Thus when Columbus and his adventurers were ready to undertake their voyage of exploration, the state of the art had reached such a stage as to allow its successful consummation.

There was really nothing much in the line of speed improvement on land from the heyday of Rome until the beginning of the Nineteenth Century, when the present era of speed was inaugurated.

The demand for quick service of passengers and goods had grown very insistent with the spread of trade and the tremendous pressure for commerce.

The invention of the cotton gin in 1793 was an aggravation of the situation, because it helped to emphasize the congested world conditions, but it had the effect of stimulating experiment in the line of transportation, and because it did so, it may be reckoned as one of the big elements that led to modern speed.

In 1809 the historic Clermont, the pioneer of steamships, made its appearance, although rude trial vessels using steam power had been experimented with for many years.

In 1814 Stephenson's steam locomotive came into practical being and with these two inventions the world bounded forward as it never had since the day of its creation.

The telegraph was first tried out in France in 1794, but did not come into practical use until the Morse system was installed in the United States about 1844.

The sewing machine, which must be reckoned with as an element in the development of speed, was invented in France in 1830, but became a commercial actuality in 1850 in the United States.

Electricity as the motive power for transportation of passengers and freight was first seriously considered in 1835 and further experiments were made in this line by Professor Page, of the Smithsonian Institution, in 1851. The first road to be operated by trolley was in 1888, when a short road so equipped at Richmond, Va., used the system with success.

Transportation made so much progress during the first three-quarters of the Nineteenth Century that business methods had to be adjusted to meet the new conditions and the ingenuity of men devised the typewriter, linotype and telephone, increasing the efficiency of the business man in the ratio of five to one.

Development in All Lines was Faster Than Ever Before, Presenting the Need of More Speed

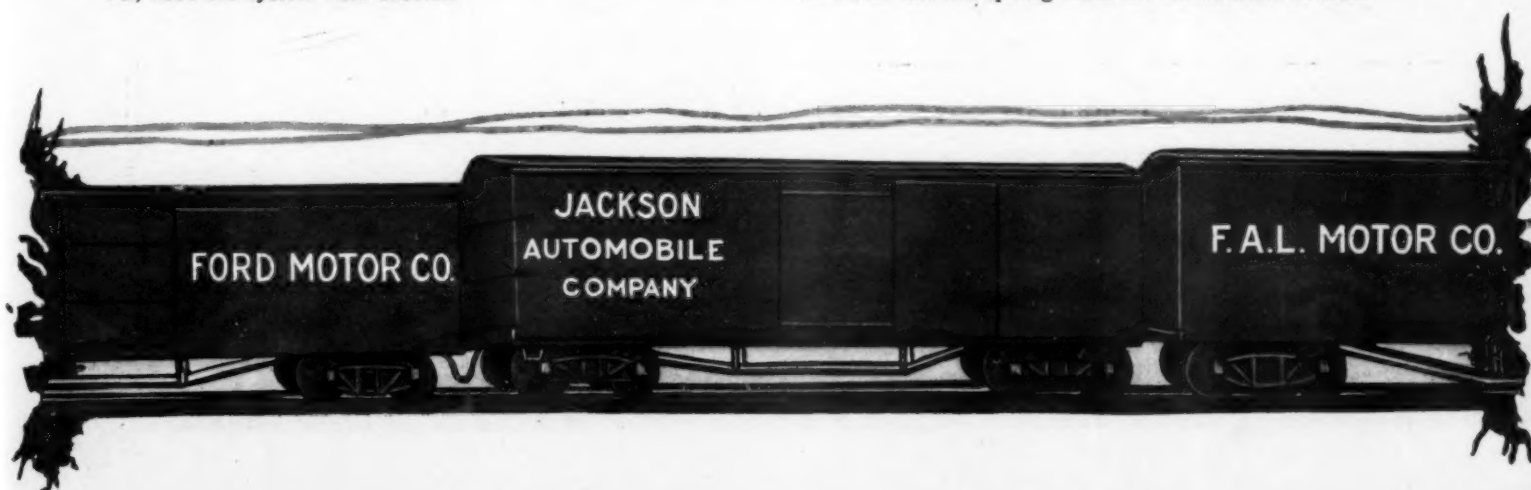
Then followed the invention of the gasoline automobile, wireless telegraph, and the aeroplane at present is being developed to serve a purpose in the mission of speed to humanity.

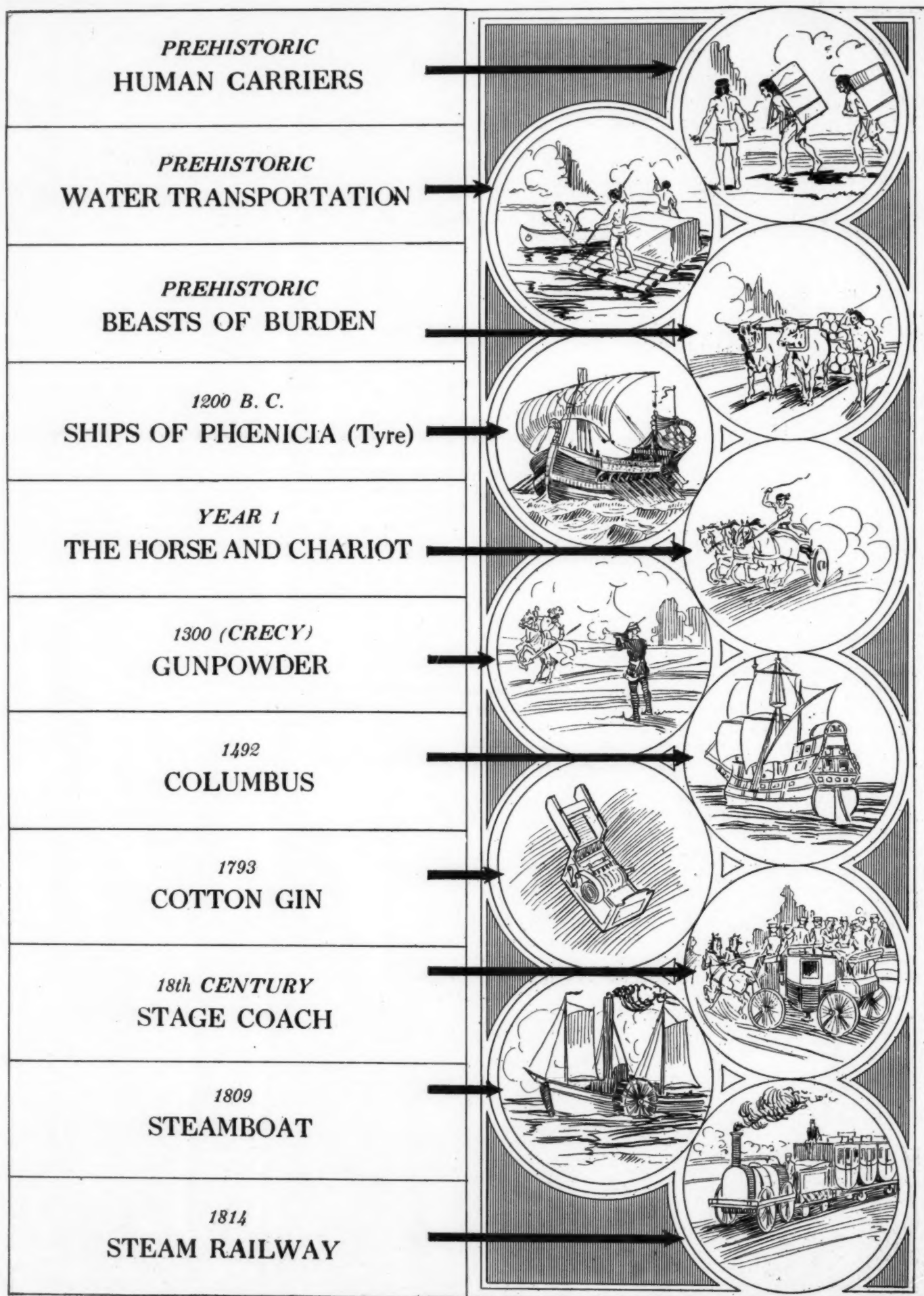
To-day the world uses every form of transportation that has ever been used since the dawn of creation. There are certain sections where the human burden bearer and the pack-bullock compete with the raft and dug-out. In others the ships of ancient Tyre have their counterparts. Some places in the United States depend upon the stage service of the Middle Ages for communication with the outer world. But high and clear above these backward communities and districts stand out the nations and peoples who have followed the advance of progress in transportation and who use the swiftest methods that have been developed.

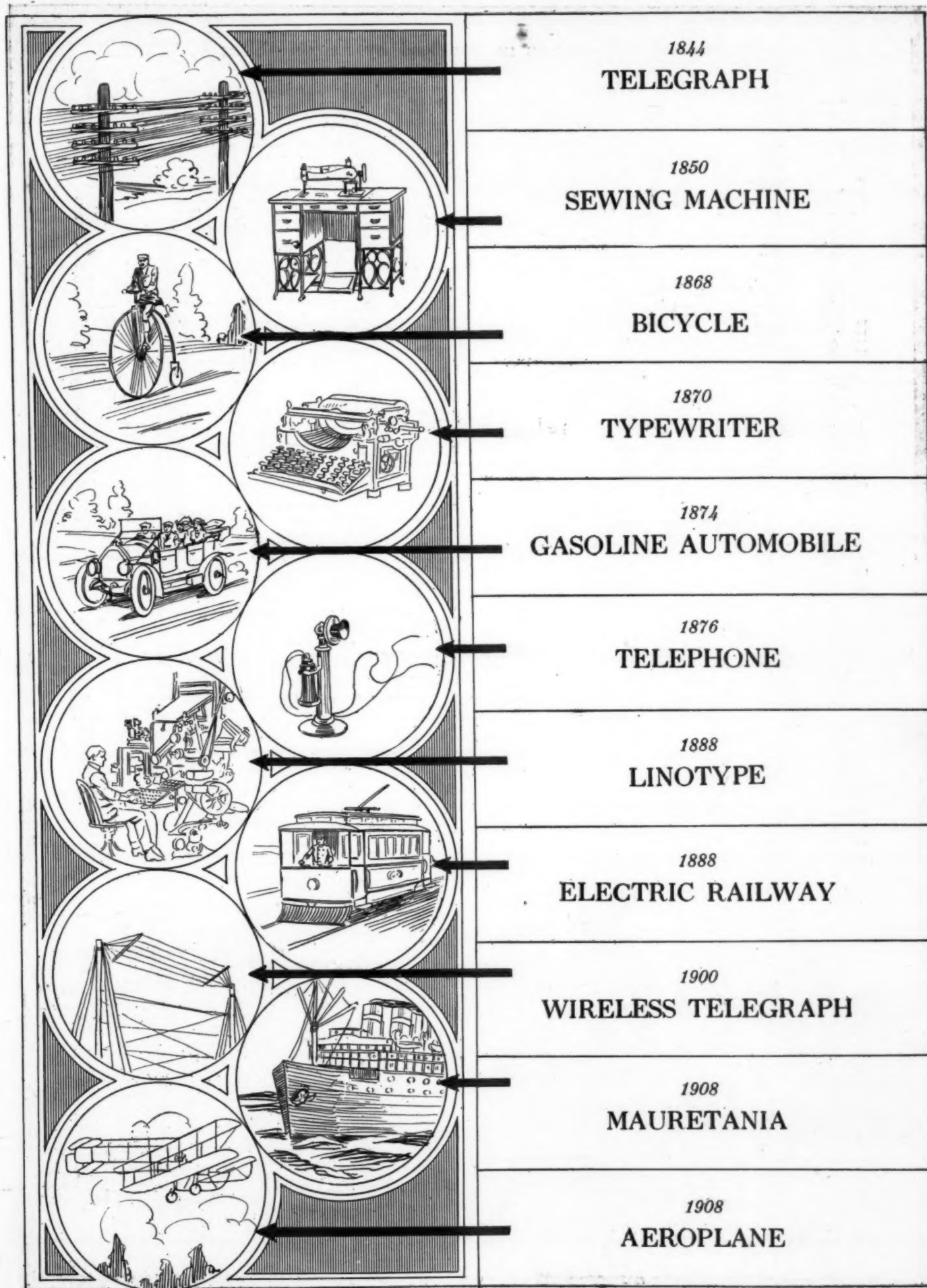
At two miles an hour only a limited commerce is possible and the business world is divided into small localities that effectively prevent anything in the nature of a broad civilization. At four miles an hour the range is greatly increased, and such a speed probably represents the progress of the Roman empire at the height of its power and glory.

In the middle of the Nineteenth Century there was a leap upward in speed to an average of 10 miles an hour, with a maximum of 20 miles an hour, and modern commerce had its birth. Midway from there to the end of the century, speed developed so consistently and so fast that average figures lost their significance and the maximum of about 40 miles an hour was reached.

To-day the stock type of average automobile can make above 60 miles an hour; aeroplane about the same; railroad trains run on a schedule at that rate and can double it in exceptional cases, but the most powerful automobile so far developed can outstrip the train and stands alone as the fastest mechanical means of travel that has sprung from the fertile brain of man.







Speed Milestones as Marked by Automobiles

STRAIGHTAWAY RECORDS			
Distance	Car	Driver	Time
1 kilometer	Benz.	Oldfield.	17.04
1 mile	Benz.	Oldfield.	27.33
2 miles	Benz.	Oldfield.	55.87
5 miles	Darracq.	Hemery.	2:34
10 miles	Benz.	Bruce-Brown.	5:14.40
15 miles	Fiat.	Lancia.	10:
50 miles	DeDietrich.	Fletcher.	38:51
100 miles	Renault.	Berlin.	1:12:45.20
200 miles	Stod- Dayton.	DeHymel.	3:02.22

SPEEDWAY RECORDS			
Distance	Car	Driver	Time
1 mile	Benz.	Oldfield.	17
1 kilometer	Benz.	Oldfield.	21.45
1 mile	Benz.	Oldfield.	35.63
2 miles	Fiat.	Bragn.	1:15.96
5 miles	Fiat.	De Palma.	3:15.62
10 miles	Simplex.	Robertson.	6:35.62
15 miles	Benz.	Hearne.	10:25.17
20 miles	Benz.	Hearne.	14:06.72
25 miles	Piat.	DePalma.	18:52
50 miles	Fiat.	De Palma.	37:55.53
75 miles	National.	Aitken.	1:03:31.09
100 miles	Lozier.	Tetzlaff.	1:14:29.20
150 miles	Marmon.	Harroun.	2:02:16
200 miles	Marmon.	Dawson.	2:43:20.14
250 miles	Lozier.	Horan.	3:26:15

CIRCULAR DIRT TRACK RECORDS			
Distance	Car	Driver	Time
1 mile	Fiat.	De Palma.	48.92
2 miles	Fiat.	De Palma.	1:40.55
3 miles	Fiat.	De Palma.	2:30.55
4 miles	Fiat.	De Palma.	3:22.27
5 miles	Fiat.	De Palma.	4:11.90
10 miles	Fiat.	De Palma.	8:31.20
15 miles	Benz.	Oldfield.	13:42.20
20 miles	Fiat.	De Palma.	18:30.80
25 miles	Fiat.	De Palma.	22:59.60
50 miles	Benz.	Oldfield.	48:18.20
75 miles	Buick.	Strang.	1:19:39
100 miles	Buick.	Burman.	1:41:00.40

CLASS "B" SPEEDWAY RECORDS			
451 to 600 Cubic Inches			
Distance	Car	Driver	Time
5 miles	Knox.	Oldfield.	4:01.36
10 miles	Fiat.	Robertson.	7:47.71
20 miles	Fiat.	De Palma.	15:57.41
50 miles	Fiat.	Robertson.	42:02.98
100 miles	Fiat.	Robertson.	1:22:35.35
150 miles	Fiat.	Robertson.	2:05:00.63
200 miles	Rainier.	Disbrow.	2:53:48.32

301 to 450 Cubic Inches			
Distance	Car	Driver	Time
5 miles	National.	Kincaid.	4:05.76
10 miles	National.	Aitken.	7:55.12
15 miles	National.	Aitken.	11:48.78
20 miles	Marmon.	Dawson.	15:57.63
50 miles	Marmon.	Dawson.	39:47.35
75 miles	Marmon.	Dawson.	1:00:16.34
100 miles	National.	Kincaid.	1:23:43.11
150 miles	Buick.	Chevrolet.	2:05:02.17
200 miles	Buick.	Chevrolet.	2:46:48.47
250 miles	Buick.	Burman.	4:38:57.4

231 to 300 Cubic Inches			
Distance	Car	Driver	Time
5 miles	Marmon.	Dawson.	4:16
10 miles	Marmon.	Harroun.	8:16.08
20 miles	Buick.	Chevrolet.	17:10.70
25 miles	Marmon.	Harroun.	21:48.92
50 miles	Marmon.	Harroun.	42:41.33
75 miles	Marmon.	Harroun.	67:31.07
100 miles	Marmon.	Harroun.	1:30:08.31

161 to 230 Cubic Inches			
Distance	Car	Driver	Time
4 miles	E-M-F.	Witt.	3:49
5 miles	Buick.	L. Chevrolet.	4:35.47
10 miles	Buick.	L. Chevrolet.	8:55.40
20 miles	Chalmers.	Knipper.	19:51
50 miles	Buick.	Nelson.	50:36
100 miles	Chalmers.	Knipper.	1:40:46.81

160 Cubic Inches and Under			
Distance	Car	Driver	Time
5 miles	Herreshoff.	Roberts.	5:22.87
10 miles	Herreshoff.	Roberts.	10:37.59

CLASS "C" SPEEDWAY RECORDS			
160 Cubic Inches and Under			
Distance	Car	Driver	Time
5 miles	Fiat.	De Palma.	5:54.42
10 miles	Fiat.	De Palma.	11:30.48
15 miles	Fiat.	De Palma.	17:07.81

161 to 230 Cubic Inches			
Distance	Car	Driver	Time
5 miles	Buick.	J. Nikrent.	4:20.20
10 miles	Buick.	J. Nikrent.	8:40.17
15 miles	Buick.	J. Nikrent.	13:14.52
20 miles	Buick.	J. Nikrent.	17:37.36
25 miles	Buick.	J. Nikrent.	22:00.47
50 miles	Cole.	Endicott.	43:49.69

231 to 300 Cubic Inches			
Distance	Car	Driver	Time
5 miles	Marmon.	Harroun.	3:55.97
10 miles	Dorris.	Siefert.	8:41.45
15 miles	Dorris.	Siefert.	12:59.95
20 miles	Marmon.	Harroun.	17:15.47
25 miles	Marmon.	Harroun.	21:26.54
50 miles	Dorris.	Siefert.	42:30.08
75 miles	Marmon.	Harroun.	1:03:54.28
100 miles	Marmon.	Harroun.	1:25:22.07

301 to 450 Cubic Inches			
Distance	Car	Driver	Time
5 miles	Buick.	J. Nikrent.	3:49.36
10 miles	Buick.	J. Nikrent.	7:36.61
15 miles	Marmon.	Dawson.	12:04.99
20 miles	Marmon.	Harroun.	16:04.40
25 miles	Marmon.	Harroun.	20:08.69
50 miles	Marmon.	Harroun.	39:53.55

451 to 600 Cubic Inches			
Distance	Car	Driver	Time
5 miles	Knox.	Oldfield.	3:38.61
10 miles	Knox.	Oldfield.	7:20.66
15 miles	Isotta.	Marquis.	11:32.34
20 miles	Isotta.	Marquis.	15:29.18
25 miles	Isotta.	Marquis.	19:24.92
50 miles	Isotta.	Marquis.	39:20.69

24-Hour Track Races			
Stock Chassis.	Lozier.	Patschke & Mulford.	Distance
Class "C".	Stearns.	Poole & Patschke.	1,196 mi.
			1,253 mi

1910 ROAD RACES					
Santa Monica, Los Angeles, Cal., November 24.					
Classification	Car	Driver	Distance	Time	M.P.H.
301-600 st. ch.	Lozier.	Tetzlaff.	151.506	124:10.80	73.20
Free-for-all.	Lozier.	Tetzlaff.	202.008	169:59	71.30
251-300 st. ch.	Duro.	McKeague.	101.004	101:04.60	59.95
Under 251 st. ch.	Maxwell.	Fancher.	101.004	102:31	59.11

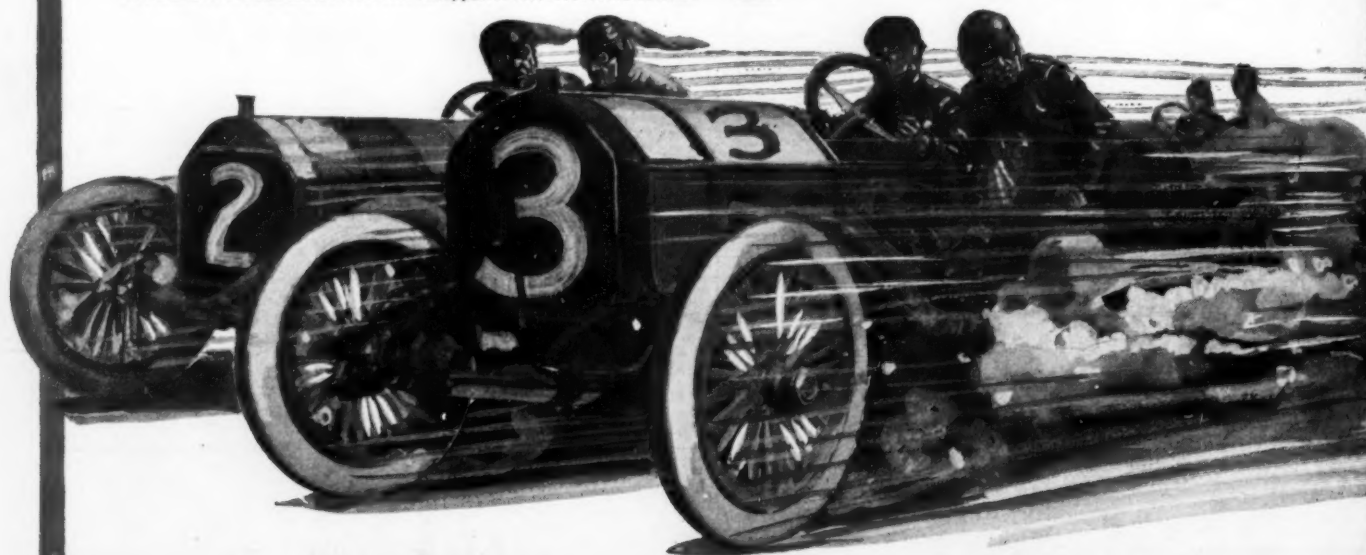
*Grand Prize, Savannah, November 12.					
Free-for-all.	Benz.	B. Brown.	415.2	353:05.35	70.55
231-300 class C.	Marmon.	Dawson.	276.8	263:39.98	62.98
161-230 class C.	Lancia.	Knipper.	190.3	195:22.67	58.44

Vanderbilt Cup, L. I. Parkway, October 1.					
301-600 class C.	Alco.	Grant.	278.08	255:58.64	65.18
231-300 st. ch.	F. A. L.	Gelnaw.	189.6	194:39.67	58.44
161-230 st. ch.	Cole.	Endicott.	126.4	138:04.32	54.92

Elgin National, Elgin, Ill., August 26-27.					
Under 600 st. ch.	Lozier.	Mulford.	305.039	292:29.84	62.56
301-450 st. ch.	National.	Livestone.	203.359	201:08.53	60.67
231-300 st. ch.	Marmon.	Buck.	169.466	184:45.79	55.04
161-230 st. ch.	Benz.	Hearne.	135.573	150:40	53.98

Fairmount Park, Philadelphia, October 8.					
Under 750 class C.	Chadwick.	Zengle.	202.5	209:07.88	58.09
601-750 div. 6C.	Chadwick.	Zengle.	202.5	209:07.88	58.09
451-600 div. 5C.	Lozier.	Mulford.	202.5	209:13.30	58.07
301-450 div. 4C.	National.	Aitken.	202.5	222:20.75	54.64
231-300 div. 3C.	Pullman.	Gellard.	202.5	237:04	51.25
161-230 div. 2C.	Ab.-Det.	Padula.	202.5	235:27	51

Desert Race, Los Angeles to Phoenix, November 5-7.					
Free-for-all.	Kisselkar.	Herrick.	412.0	949:40.00	26.03
*International race (sanctioned by A. C. A.).					
†Running in twenty-third lap when stopped and awarded race in its division.					



Trend in Body Construction

Discussing Refinements in Touring Bodies and Advantages of Enclosed Rigs with Inside Control for Drivers



THROUGHOUT the history of the building of automobiles from the first car down to the present time, it has been the body that made the sale in nine cases out of ten, and style has dominated the situation for the most part. Body work in the pioneer days was overshadowed by the types of vehicles that were drawn by horses, and body makers were recruited from the carriage makers' ranks so that originality from the automobile point of view was sadly influenced betimes. After two or three years of putting up with inappropriate body designs, a school of automobile body builders rose up and destroyed the passing situation, cutting free from the old environment, and burning all bridges that

prevented the automobile from coming into its own. There still remained a certain difficulty, due to the fact that the clientèle of the automobile knew little or nothing about the mechanisms, and purely art situations influenced all purchasers.

Even three or four years ago there were two classes of automobile builders, one of which went in for quality of the mechanism, the other being divided on appearance of the body. It was then said that a good automobile could not be sold, due to the fact that the mechanism cost so much money that there was very little left with which to build a good body. The other side of the situation was that a \$2,000 body, if placed upon a \$1,000 automobile, could be sold for \$5,000. But merit reigns in the long run, and the time finally arrived in the automobile business when good mechanisms could be produced at a reasonable cost, and

good body work could be had without destroying utility.

The modern trend has for its foundation the fullest measure of utility, and the present-day body builder knows how to maintain appearance and to deliver in addition thereto the little refinements that cater to the comfort of the owner of the car, so that it is not too much to claim that the automobile of to-day has a certain inherent harmony of relation of the mechanisms of the machine proper, the body work as it serves its broad purpose, and the adornments that the discriminating owner is likely to enjoy. In thus bestowing consistency upon the automobile, it has been at considerable cost of ingenuity, with experiments upon the cars and the public as well, it being the case that no man can claim to be so wise that he will be able to build what purchasers want before he gives to them the fullest opportunity to saturate themselves with the idea and feel its effect upon them.

Fore-Door Types of Bodies Struck a Popular Chord and They Represent a Heretofore Unheard-of Utility Situation

Using Fig. 1 for the purpose of illuminating the text, bringing out the points that are to be made, attention will again be called to the discussion that has been going the rounds bearing upon the ventilation of the fore-door type of body, for there are those who still claim that the fore-door will entrap all of the heat that rises up through the foot-boards, and that the occupants of the front seats of this type of body will be rendered uncomfortable in the Summer time, although it may not be out of place to point out that these prognosticators always overlook the fact that the fore-door type of body has made Winter automobiling a reasonable proposition.

To the man who is accustomed to cope with the retarding influences that confront him in his every-day work, the greatest difficulty arises in inducing a reasonable measure of comfort in

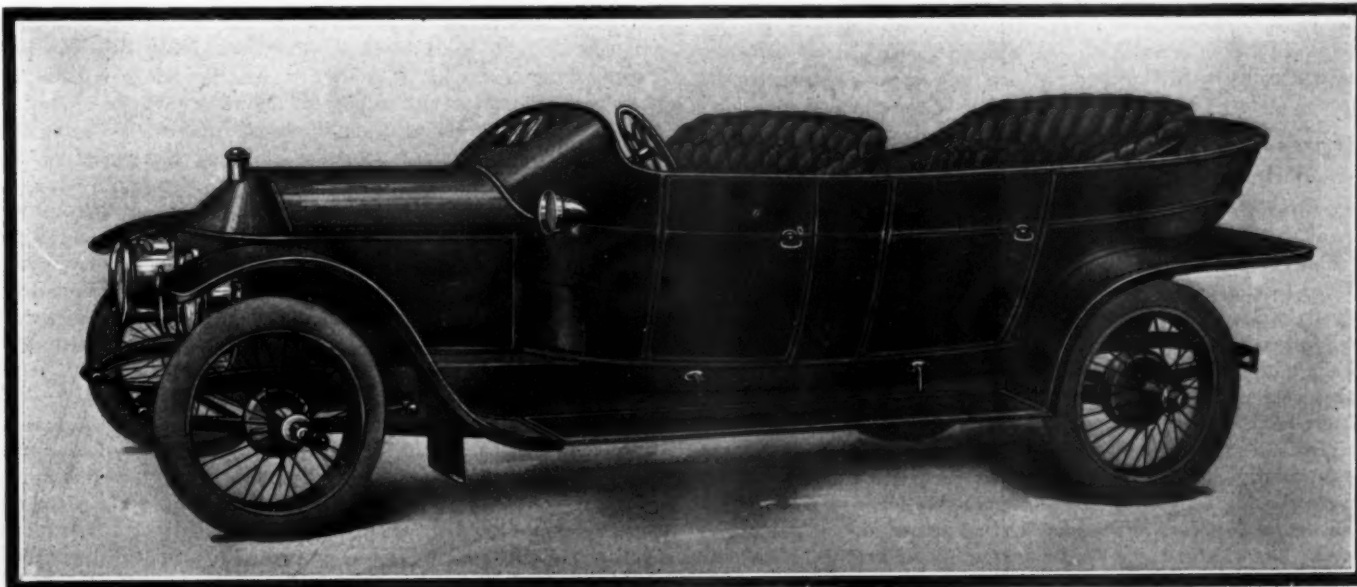


Fig. 1—Enclosed type of body, showing method of ventilating the front and the construction of the rear seat so arranged as to prevent dust from contacting with the occupants thereof

the Winter time when the temperature falls to near zero, and the automobile as it moves swiftly along increases the rate of speed of cold wind, and adds marvelously to the requirement of the type of facilities that argue for the necessary warmth.

With this trouble out of the way, the designer is merely confronted by two situations, both of which assuredly must bend to treatment. If heat comes up through the foot-boards, it must be because it is not permitted to travel in some other direction. It may also be said that if the foot-boards are highly heat-conducting, it only remains to so insulate them that heat may not be permitted to migrate through their section. Having done everything possible to prevent heat from passing up through the foot-boards instead of some proper channel, it remains to ventilate the body, and, as Fig. 1 shows, this is a mere matter of putting ventilating openings (a) at each side, at the break of the body on the dashline and (b) in the upward sweep of the overhanging cowl. In some types of enclosed bodies the fore-door is of the "Dutch" type so that it may be removed if the owner so elects, replacing it during periods of inclement weather, and the means at hand for attaching and detaching the door are such as to facilitate the work.

Referring again to Fig. 1, it will be observed that the rear seat falls inside of the break of the body, the idea being to protect the occupants of the rear seat from the dust that sweeps up following the contour of the body, curling inboard slightly and in some types of bodies clinging with great tenacity to the head-gear and the back of the heads of the unfortunate passengers. This relatively new idea overcomes this serious difficulty, and the intervening space between the upholstery and the seat proper and the back of the body is rendered available as storage room for extra apparel or what not. The general appearance of this body is in keeping with the modern idea, and among the remaining notable points is the wide side entrance to the tonneau.

Expression of Some of the Ideas that Doctors Adhere to with Tenacity, Indicating the Direction in Which Experience Is Leading Them

There are very few doctors in every-day practice who can afford to engage the services of a chauffeur in addition to paying from \$25 to \$30 per month for the storage of an automobile, not forgetting that the repair bill and other extras will be greater if the automobile is stored in a garage than it will if the owner takes care of it himself, having a little garage on his premises. There is absolutely nothing that tends to lower the cost of maintaining an automobile so much as when the owner assumes the responsibility, thus giving him a chance to discriminate as between the character of the performance that leads to a repair bill and the kind of service that may be had at a minimum cost. The psychology of the whole situation may be summed up when it is said that the chauffeur is paid to drive the automobile when it is in good order and to take it to a repair shop when its condition indicates that further work is only to be expected of it after it undergoes a somewhat expensive process. The difference be-

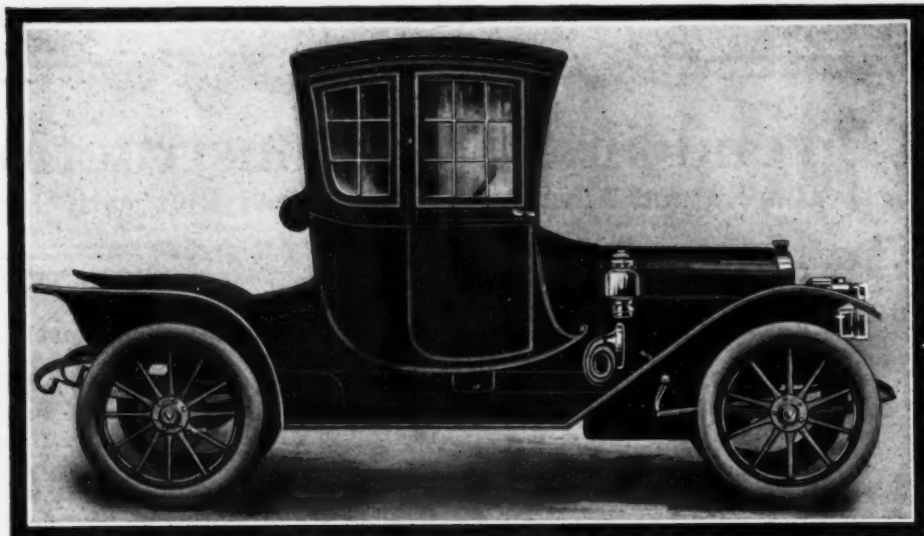


Fig. 2—Enclosed inside drive doctor's rig designed in imitation of a sedan chair with a turtleback

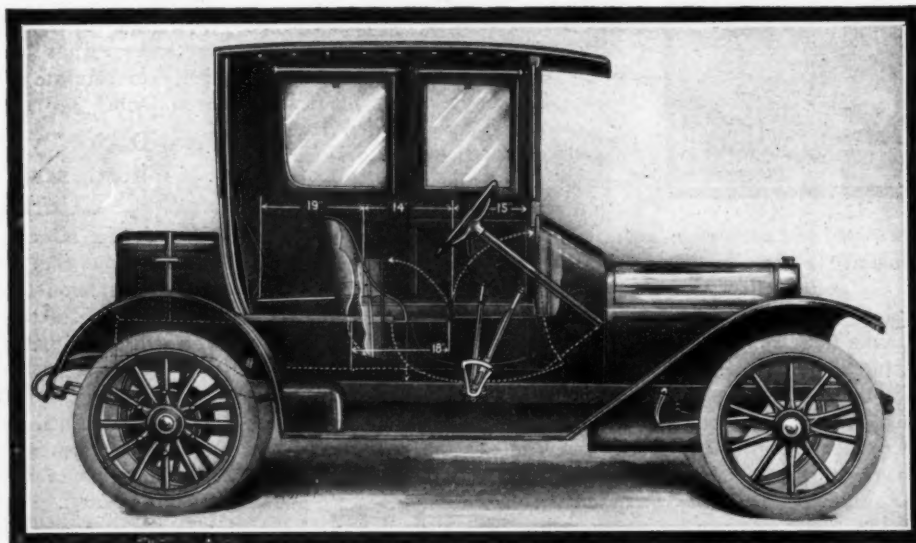


Fig. 3—Showing the inside arrangement of an enclosed inside control doctor's car designed to accommodate three persons

tween the owner and the chauffeur as it is indicated in a study of psychology is represented by the distance between the two horns of the dilemma. It is the purchaser's idea to reverse the plan of the chauffeur and to prevent the automobile from getting out of whack in order to debar the repair man from placing the imprint of his trademark upon the most expensive part of the car.

But a doctor cannot start out in great haste for the purpose of performing a surgical operation upon an anxiously awaiting patient and take the chances of having to deal with a large and complicated car, coping with tire trouble of the most serious sort as the most prevailing menace; nor can the surgeon be expected to destroy the deft movements which are possible with well-trained hands, but which are rendered impossible by overstraining and abuse. Under the circumstances an automobile, to render satisfactory service to a doctor, must be extremely well designed, of relatively light weight, and of moderate speed, and it must also be so fitted out that it will go along the road with a minimum of effort on the part of the driver, protecting him at all times from the cold or excessive warmth, and the illustrations Figs. 1, 2, 3 and 4 have been suggested as in line with the needs of this profession.

All of these bodies are placed upon the same chassis, selecting one of moderate weight and power, and the arrangement for the inside drive also has the advantage of placing the

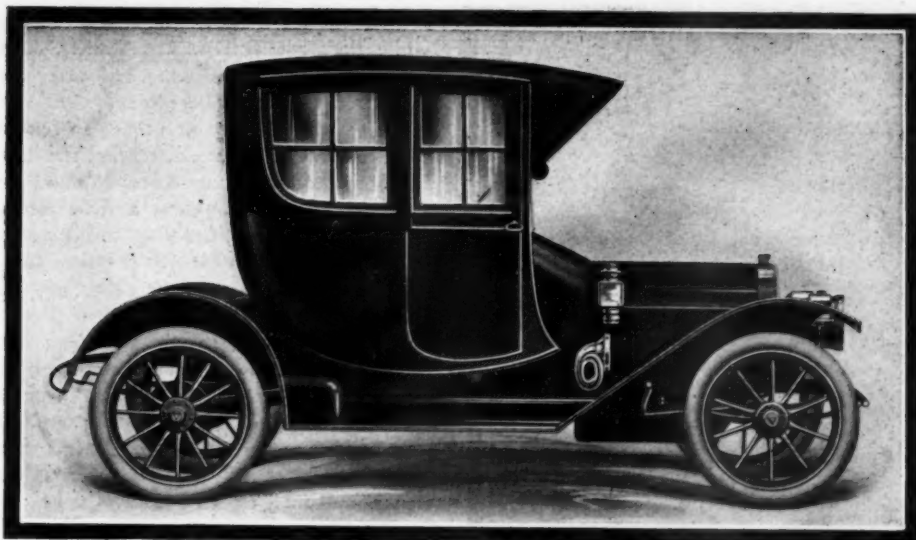


Fig. 4—Special form of enclosed inside control doctor's car with a visor front and a turtleback

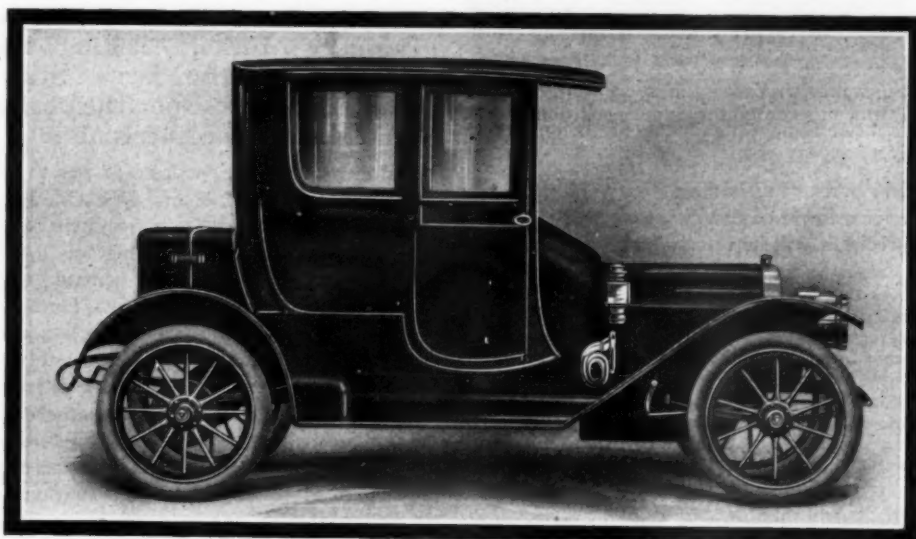


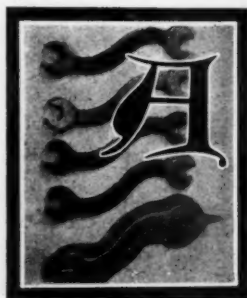
Fig. 5—Type of doctor's car along conventional lines fitted to a relatively light automobile with a trunk on the deck at the back

driver upon the left-hand side, thus permitting him to turn out for other vehicles, and to observe the amount of the clearance as he passes them by. Fig. 2 shows a design which was taken from an old sedan chair, and while the art effect is a little quaint, the fact remains that the appearance on the whole is agreeable. Fig. 3 shows an inside-drive enclosed car sectioned through the middle of the body, giving the dimensions of the seat and the arrangement by which three passengers may be readily accommodated, it being the idea that the owner is to drive the car, offering to him the advantage of being able to associate with agreeable company when the opportunity affords. Fig. 4 shows another variation of the enclosed inside-control body, and while it has some of the lines of the sedan idea, it departs sufficiently therefrom to destroy the original quaintness of the design as shown in Fig. 2, adding a dash of modernism. The visor at the front represents a happy thought, preventing sunlight from splashing against the plate glass and destroying the ocular ability of the driver to penetrate for a distance ahead. Fig. 4 is more in keeping with standard practices, and it should prove attractive to the type of doctor who prefers the inconspicuous. This model is fitted with a trunk on the back platform, corresponding to the trunk as shown in Fig. 3, whereas Figs. 1 and 2 are equipped with a turtle-back with storage room thereunder.

These bodies do not represent the limit in possibilities along this line, but they do show that there is no reason why a doctor should be left out in the cold just because his circumstances are such that he must use in his business a light, low-powered car.

Placing the Automobile in Commission

Prior to a Season's Service the Automobile Should Be Put in a Good State of Repair, Replacing the Worn-Out Parts and Adjusting the Relations



APPROACHING the touring season should be a reminder to the automobilist that the pleasure to be derived from the use of a car will depend entirely upon the care with which it is overhauled prior to placing it in service, and that the cost of the service during the touring time will be the absolute minimum if a reasonable amount of money is expended in overhauling work in the first place. There are two choices for the automobilist

who keeps his car in his own garage at home, one of which is to send the car to a repair shop for the purpose of having the neces-

sary work done, and the second choice lies in the supervising of the work himself, employing a man and a helper for the purpose of carrying out his instructions. The second method of procedure is a good one, but it would be inexpedient to look around and find some fellow who happens to be out of work and to engage him to perform as best he may the exacting service, for no better reason than that he may be had at small cost. A capable automobile repair man, considering the fact that he would only be engaged for one week at the outside, might cost from \$35 to \$50, and a capable helper would cost perhaps 60 per cent. of this sum.

Assuming that the work is to be done in the owner's garage, the first thing to do is to remove everything from the garage, clean the place out thoroughly, and then replace the supplies,

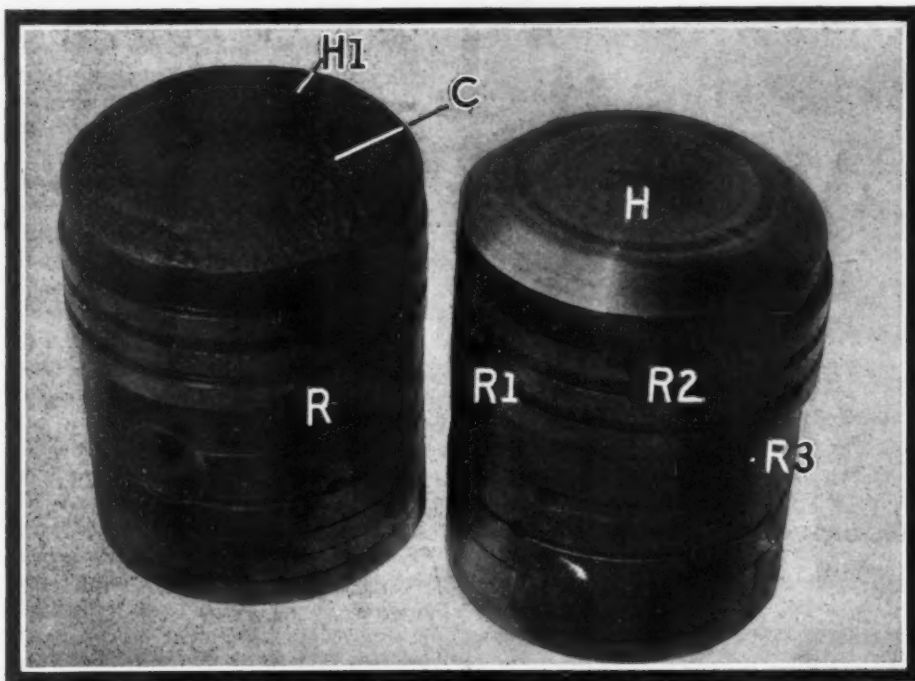


Fig. 1—Showing a piston H1 removed from a motor that had been running for several months without attention. The other piston H was in exactly the same condition before being cleaned. The rings R1, R2 and R3 have been removed and the pit behind them extricated. (Photo taken at Cimlotti Garage)

tools and other necessary things, putting each article in its place, and by a system of tags mark everything so that time will not be wasted in vain searches for the necessary tools and supplies such as will further the work of overhauling the automobile. Having thus arranged for the taking apart of the automobile, if it may be assumed that the tools and supplies are sufficiently complete to warrant proceeding with the work, the car should be rolled in and so placed on the floor that it may be gotten at from every point of vantage, and with a pair of horses that may be improvised for the purpose if they are not available, the chassis should be lifted high enough off the floor and rested upon the horses to make the further effort an agreeable undertaking. Workmen, in shops, are provided with benches of a certain height, because it has been found after long years of practice that their muscular efforts will be on a more efficient basis, and work instead of being a tiresome effort becomes an agreeable undertaking. With the chassis resting upon the horses, the car will then be ready to be taken apart. This undertaking can be started by removing the four wheels of the automobile, and a large pan of kerosene oil if placed adjacent to the scene of action may be used to put the bearings in soak, where they should be kept until all of the old grease and foreign matter is softened, after which the bearings and other parts should be taken out, thoroughly cleaned, dried, tagged, and put in a box by themselves, marking the box "bearings and small parts for road wheels." It is at this point that the novice will make his first mistake. He will say to himself, while these bearings are being soaked I will tear down the motor. But to thus proceed means that all questions of identification

and other ramifications that would help the novice to proceed with safety and end with precision will be utterly lost.

There is just one way that will bring success to a man who does not make a business of repairing automobiles. He must take the several units apart, one at a time, clean the component pieces, tag them, and lay them down in logical array, in order that he will be able to find them when they are needed, and to reassemble them in the order of taking apart, so that the finished product will work.

Having disposed of the ball or roller bearings and the small parts in the hubs at

the road wheels, the tires may be washed while they are still on the wheels, using tepid water and castile soap, and after they are dried they may be glossed over with graphite. It will then be proper to remove the tires from the wheels, extract the inner tubes therefrom, clean them off, and put them in a box, sprinkling a little talcum over them, and with the tires and the tubes thus ready to put aside for the time being they may be taken into the cellar and put upon a shelf in a dark place where they will keep without deteriorating for a long time. The cases and tubes may require some repair work to be done upon them but this work may be deferred until the car is overhauled mechanically, and put into such shape that tires may be taken up as the logical and final effort.

Having Removed the Wheels and Mudguards the Ambitious Repairman Will Then Be in a Position to Start in with the Machinery Units, Taking His Choice as to the Place of Starting, Depending Upon the Design and Make of the Automobile

In all probability it will be proper to remove the links and levers of the brakes, and the sliding gear control system, ending with the removal of the links and levers of the spark and throttle control, thus stripping the chassis of the small functioning parts, remembering the injunction that each piece as it is taken off should be cleaned and tagged. The little pins, nuts and like parts after they are cleaned should be put back into the holes from which they may be taken, so that later on they may be examined to see if there is too much shake, or if they are in good order there

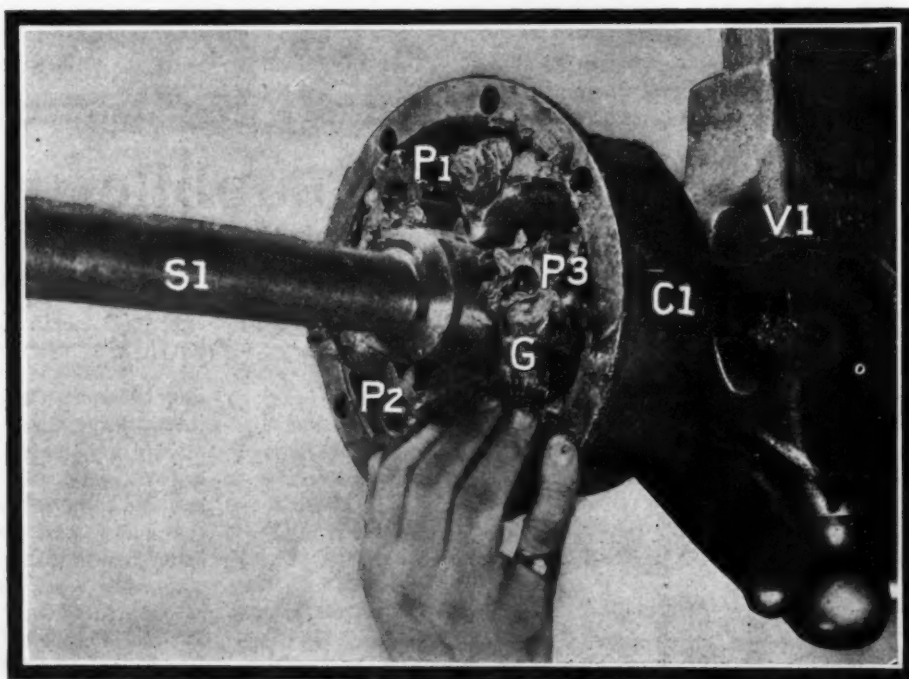


Fig. 2—This method of inserting grease in a differential is used in cases where oil will not stay in the casing proper or where the differential case C1 is without the necessary openings for the oil to find its way in. The shaft is held in the vise V1 and the pinions P1, P2 and P3 are being packed with grease. (Photo taken at Hudson Garage)

will be no difficulty in finding them at the proper time of reassembling the car.

It is more than likely that the steering gear will come away at this juncture, and upon removing it should be taken apart, cleaned thoroughly, and if it is in good working order, it may be put together again without further waiting, or if it is out of repair, the parts should be tagged and the entire outfit should then be placed in a separate box to await a convenient time for the making of the repairs.

If the automobile is of the shaft-drive type, the next plan of battle depends upon where the transmission gear is located. If the car is designed with a transmission gear and live rear axle as a unit the universal joint at the extremity of the torsion tube may be taken apart, the springs may be unbolted at the perches, and the live rear axle, with the gear and torsion tube together, may then be dropped down and rolled to a point in the garage where the unit may be taken apart piece by piece, and after cleaning, each piece, involving the kerosene oil bath, they may be tagged and laid down in a row ready for inspection and further work. But if the transmission gear is located amidships on the chassis, the live rear axle may be taken away as above described, and it will then be proper to remove the clutch and its mechanisms prior to the removal of the transmission gear.

The taking down of the clutch should involve the same care and system that obtains for the live rear axle, and with all parts removed, washed, cleaned, tagged and laid in a separate row, the repairman will then be in a position to apply himself to the taking down of the transmission gear, when it may be disassembled, the parts cleaned and tagged and grouped by themselves.

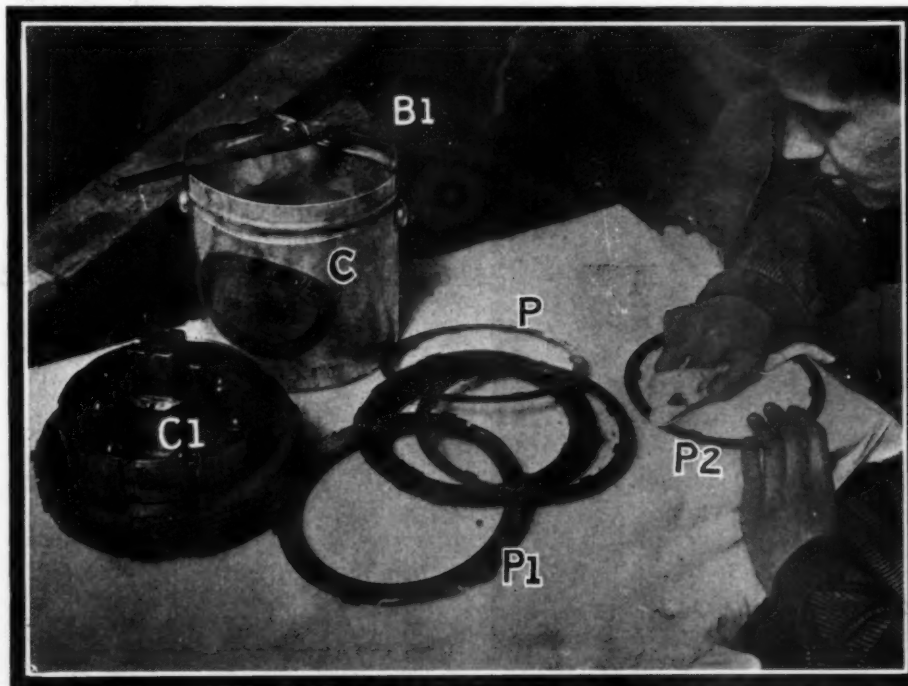


Fig. 3—Small particles of the metal wear off the plates of multiple disc clutches and form with the oil a film of slime which adheres to the plates. It is necessary to take the clutch C1 out from time to time and with the aid of some gasoline and a brush B1 to wash and wipe each plate separately in manner indicated (Photo taken at Alco Garage)

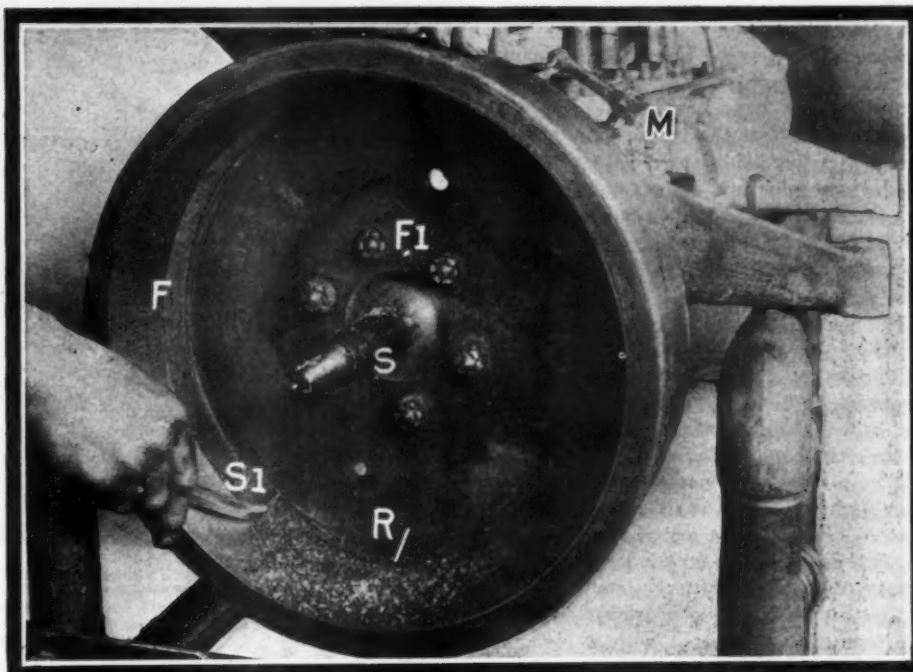


Fig. 4—There is bound to be a certain amount of foreign matter accumulating inside the flywheel (F1) of leather cone clutches. It is necessary to remove the leather-faced portion entirely and scrape off the accretions R with the scraper S1. At the same time one has an opportunity of inspecting the nuts F1. (Photo taken at Cimlotti Garage)

In Attacking the Motor It Will Not Be Necessary to Remove It from the Chassis Frame, but It Is of Extreme Importance to Mark Everything Before the Disassembling Process Begins, Using a Center Punch and a System of "Spotting"

In taking up with the motor, the automobilist will have an opportunity to discover whether or not his choice was a good one. If the motor proves to be of a type

that can truly be said to be interchangeable in its parts, the difficulty involved will be but slight. But if every piece is of a different size, and the automobilist fails to identify each piece in view of the place to which it was originally assigned, he will find himself in a maze of harassing intricacies and the difficulties involved may exceed his patience and skill.

Before attacking the motor proper the repairman has his choice between removing the carburetor, piping, fittings, etc., including the intake manifold, and in fine everything belonging to the fuel system back to the gasoline tank. Care should be taken not to disturb the adjustments of the carburetor. Moreover, it would be the height of wisdom to carefully mark the respective adjustments on the carburetor so that should they be disturbed by accident or otherwise the carburetor may be readjusted with certainty at the proper time. When the piping is taken down it should be cleaned out and some attempt should be made to discover whether pieces of solder or other impedimenta are lodged at any point obstructing the flow of gasoline. With the piping clean and free from obstructions, the ends thereof should be corked up, using a little waste for the purpose, if necessary, remembering, of course, that the waste must be carefully removed at the proper time and avoiding the possibility of having some of the waste pressed down into the piping where it might be overlooked, with the result that the motor would fail to serve properly after the car is reassembled.

In removing the magneto, which would be a logical thing to do after taking down the fuel system, it would be wise to spot the meshing teeth of the magneto drive in order that the gears may be remeshed in

the reassembling process without disturbing the original timing of the motor. Having taken the magneto away, to clean it thoroughly is the next operation, having in mind the fact that the universal joint and other parts that belong to the magneto unit require the same attention, and a separate box should be used for the temporary storage of the magneto and its parts, not forgetting that they should be tagged or otherwise identified.

The auxiliary ignition system should be taken down, cleaned and identified by tagging or otherwise, and it would be a good idea to put this system in a separate box rather than to mix it with the parts of the magneto ignition system.

If a storage battery is used in the auxiliary ignition system, it should be removed from its resting place, and if the owner of the car does not understand the storage battery problem the battery should be sent to a repair shop of the character wherein sick batteries are treated with a view to bringing them up to their proper working level. But if the owner of the car has charging facilities within his garage it will pay him to look into the matter of proper repair of storage batteries and to undertake the task of repairing his ignition battery on his own account, due to the fact that this class of work is not well done, as a rule, by those who pretend that they know how to make repairs of storage batteries. Space, at this time, is not available for the exploitation of the storage battery problem.

It would be optional to treat with the lighting system prior to taking up with the motor accessories, but should the lighting system be deferred until this time, it will be proper to remove the lamps, generator and piping, or the gas tank, if one is used, and beyond storing the lighting equipment in a separate place for safe keeping it would be well to defer the overhauling of the same until the car is put in good working



Fig. 6—Spring bolts require lubrication from time to time, and unless fitted with grease cups it is necessary to remove them. To accomplish this the frame F is raised by placing a block of wood W underneath both sides and lifting with the jack J, which should be placed midway between the two dumb irons. After the nut N1 has been removed the bolt B can be removed.

order, making this part of the undertaking one of the final operations, as in the case of the tires.

With Everything Cleared Away It Remains to Undertake the Disassembling of the Motor Proper, Spotting Each Piece for Purposes of Identification, Making a Record in a Book for Future Reference

The chances of getting into trouble would not be great in the disassembling of the live rear axle or even the transmission gear, but for a novice to take down the motor or disassemble the magneto without making records in a book, tying in suitable and systematic identification marks, would

be a risky thing to do. It would take but a few moments of the workman's time to spot each piece with a center punch and the entering of the record in a book obtained for the purpose would be at the cost of a very little more time. Repeated experiences have shown that 50 per cent. of all the time taken in the overhauling of an automobile is wasted in the vain search for missing parts and in trying to find out how the parts go together after they are taken apart. There are cases of record that show as much as two weeks devoted to the futile effort of trying to time the motor, all of which, due to carelessness on the part of the man who, in taking the motor apart, fails to identify the pieces and to so mark the halftime gears that they may be put together so that the teeth that mesh for the proper timing relation may be readily found and the same relations re-established in the process of assembling the motor.

In proceeding with the work it would be natural to remove all the handhole covers, taking care not to destroy the packing rings; and since it cannot be assured that the cap screws that hold the covers in place are interchangeable, it is a wise thing to put each cap screw back into the threaded hole from whence it may have been taken, so that in the reassembling process the cap screws will be available at the point where they belong. Another way is to spot the cap screws and put the same system of spots at the threaded holes where they belong. The covers should be washed, cleaned and dried and put in a box so that they will be available for use at the proper time.

When all the covers are removed the inside of the motor case will be exposed to view and the halftime gears will be exposed also. The halftime gearcase, if it was previously packed in grease, will be found in a most filthy condition, and the esthetic automobilist will hesitate to undertake the cleaning out of the cavities that abound

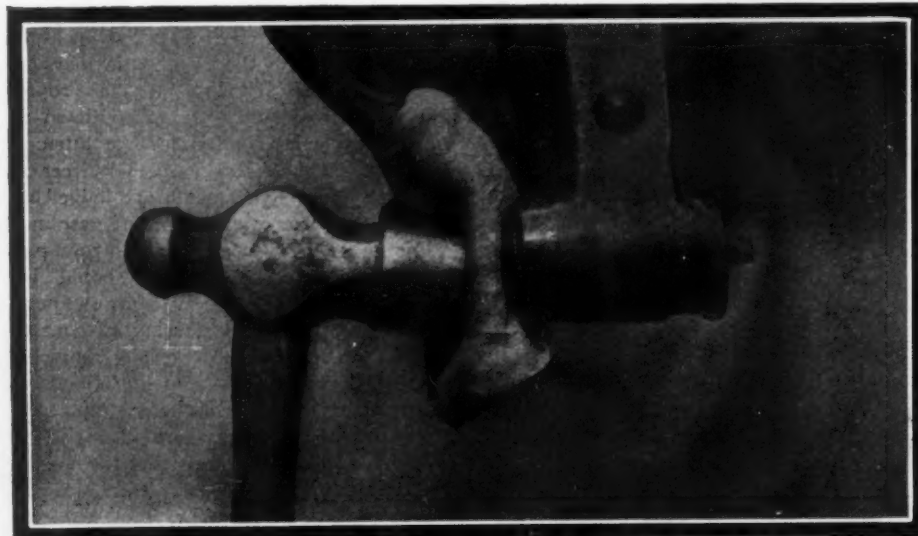


Fig. 5—How painted parts of the car should be handled when they are removed and replaced. By interposing a piece of cloth or felt between the hammer head and the part to be (as in this case) driven in, the varnish and groundwork are not damaged. A hide hammer will not answer the purpose, as anything rough, although soft, will crack the varnish.

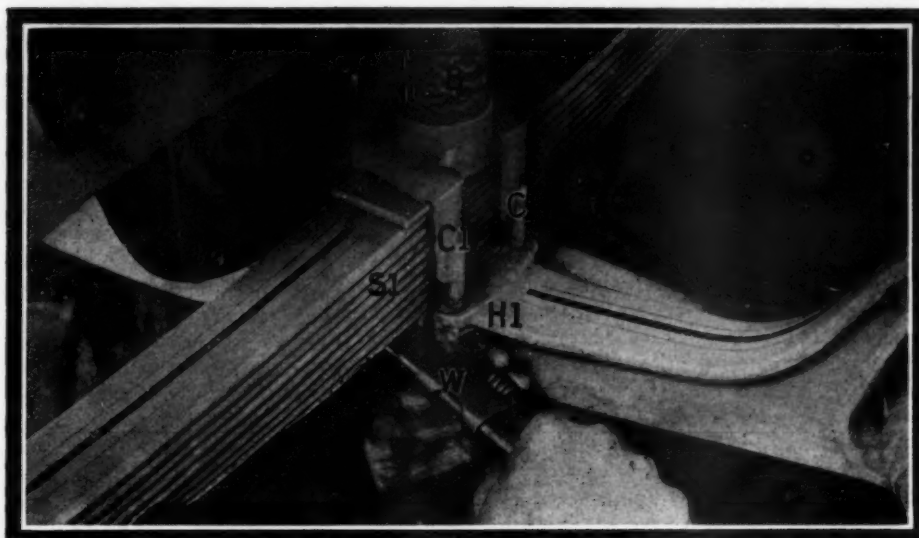


Fig. 7—The operation here depicted is not one that requires doing every year, but every few thousand miles. The reason for this is that with the continual flexure of the springs S1 the clips C1 and C have a tendency to elongate, and the only way to compensate for this is by tightening the nuts H1. The rubber bumper B is a useful shock-damper and saves the springs over ruts. (Photo taken at the White Company Garage)

therein. A wooden paddle can be fashioned in a few moments and it will serve better than anything else for the removal of the excesses of filthy, worn-out grease, after which a man-sized gun and a large pan of kerosene oil will be the proper equipment to employ in the further removal of the accumulations. It is necessary that the halftime case be thoroughly cleaned out and dry before anything else is done.

The next proceeding should be in the form of a critical examination of the halftime gears before they are removed. By hand-pressure it will be possible to observe if there is too much lost motion, or if the gears are loose on their shafts, and it will also be easy to ascertain whether or not the keys are tight fitting, and some attention should be given to the question of the condition of the teeth of the gears. If the gears are more or less worn out, the automobilist will be able to judge for himself whether or not he cares to incur the cost of a new set of gears; but there is one thing certain, if the gears are considerably worn and if the fit on the shafts is poor, the motor will never again perform up to its original standard and the sweet-running qualities that poets rave about will be unknown in the future.

Assuming that a critical inspection enables the repairman to conclude that the halftime gears are in reasonably good shape, so that with a little fitting they may be made to serve their intended purpose again, it remains to spot the meshing teeth and make a proper record in the book before the gears are taken out of the case, which is a matter of unbolting them at the flanges or pulling them off the shafts if they are of the hub type, keyed on.

The valves and valve mechanisms may next be removed, marking each valve and its relating part and making a record in the book, and as the valves and the parts are

taken down and marked it will be wise to critically inspect them in order to observe their physical condition for the purpose of determining what will have to be done to them before they are put back into place. This will be a good time to examine the valve seats and to see to what extent leaking may have obtained. If the valve seats are badly scored, and if there is considerable evidence of depreciation it will be a good idea for the repairman to make arrangements to have the seats refinished, and he will save some time by getting after this part of the work while the workman does some incidental operation, but it will not be a good idea to go away, telling the workman to remove the cylinders in the meantime, leaving it to him to carry on the system. System and the average workman

are not only strangers, but there is an intense hatred somewhere between them.

When the time comes to unbolt and lift off the cylinders it will be the moment of imminent danger, there being an excellent chance to wrench the connecting rods, destroy the piston rings and damage the surfaces of the cylinders. After the holding bolts of the cylinders are removed the workman should stand straddling the cylinders, resting his feet on planking which may be placed on the horses, and the owner of the car should stand to one side of the motor, and as the workman lifts the cylinders straight up the owner should take hold of the piston rings, maintaining the piston in the vertical position, and by a slow and cautious process the cylinders should be lifted clear and the piston rings should be held so that they will not catch and be twisted out of shape. When the cylinders are lifted off in this way, taking a good deal more care than some repairman thinks is necessary, they should be taken out in the light and critically examined in order to observe if the walls are scored or badly worn.

Some means should be at hand for measuring the cylinders in order to ascertain whether or not they are round, and if it is found that they have worn elliptical, or if the walls are scored, the cylinders should be boxed and shipped at once to a machine-shop, where they can be refinished, preferably by the grinding process, but not necessarily. If a machine-shop is not near at hand wherein cylinder grinding equipment is employed, a first-class machinist may be given the task of reboring the cylinders, taking off a finishing cut. As soon as it has been decided to rebore the cylinders, it must be concluded that new pistons will be necessary, and with them must be furnished a new set of piston rings. The new pistons must allow suitable clearance.

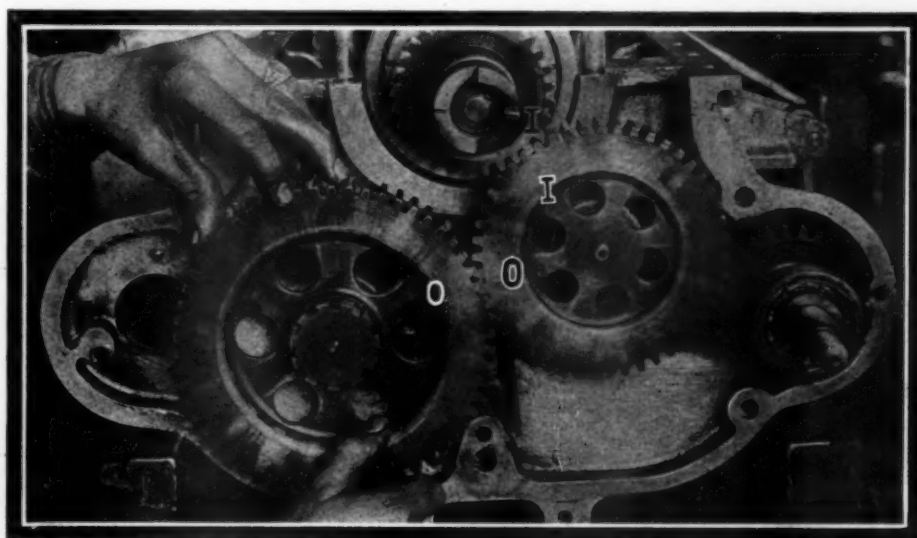


Fig. 8—In order to obtain access to some other part of the motor timing gears may have to be removed. Makers usually mark these with some distinctive numbers. Before removing the wheels verify these marks to see if they correspond. After the marking in the assembly shop it may have been advantageous to alter the setting, in which case the marks, unless altered, will not act as a guide. (Photo taken at the White Company Garage)

Any attempt to use elliptically worn cylinders by putting in new piston rings, or in other efforts to get away from the cost of reboring the cylinders, will result in much dissatisfaction to the owner of the car, at a time when he will be loath to undertake to do the job over again.

Having removed and disposed of the cylinders, it remains to take the caps off the connecting rods and to remove the piston units, one at a time, exercising some care in view of the delicacy of these members, and when all the connecting rods are thus unbolted and the units removed they should be given a critical examination concurrent with the washing and cleaning operation. This will be the time to dispose of all accumulations of carbon, silicon and other foreign matter such as may be found over the surfaces of the pistons and the cylinders, and when the cleaning operation is concluded it will be an excellent time to look for cracked piston heads, and for that matter, the cylinders should be examined for the purpose of discovering cracks such as may have developed in service.

The crankshaft and camshafts are still in place according to this mode of proceeding, and it would be a good time to exert hand pressure upon them respectively, for the purpose of noting the amount of "shake," thereby estimating as to the extent of the wear and whether or not it is uniform throughout the motor. It may be found that the main bearing adjacent to the flywheel has worn more than the other main bearing, due to the weight of the flywheel and the gyrations thereof, and it will be important to take cognizance of this point, due to the fact that crankshafts are frequently destroyed in service; since if the main bearing adjacent to the flywheel wears at a greater rate than the other main bearings the crankshaft will be subjected to undue bending moments as it thrashes around, being held tightly by the bearings remote from the flywheel, and free to mi-

grate in the main bearing adjacent to the flywheel.

In the same way, if the camshafts are too loose in their bearings, it will be impossible to expect that the motor will deliver its allotted power, due to the fact that when the cam pressure comes on, instead of lifting the valves the camshafts will bear away and the timing will be awry.

Having made observations for the purpose of becoming acquainted with the conditions surrounding the crankshaft and the camshafts and having marked the caps and other parts, entering the identification marks with notes in the book, it remains to remove these members and, after washing and cleaning them, to size the shafts and see if they are round, free from scores and in good condition in the various ways. If the crankshaft proves to have been thrashing around in loose bearings, it will have to be set up in centers and proved out. The pins tend to wear elliptical and there is nothing to do but to apply a micrometer to them at two or three points along the length and at two diameters 90 degrees remote for the purpose of observing how much the pins are out of round. If the difference is more than .0005 it will be necessary to have the crankshaft centered in a lathe, or, better yet, in a crankshaft grinding machine, and all the pins will have to be reground to roundness, taking off as little metal as possible. The bearings will then have to be re-established to fit the smaller diameter, unless they are of the kind that were originally provided with shims, in which event the bearings can be scraped in.

It is scarcely necessary to point out that the inside of the crankcase should be cleaned out with scrupulous care before refitting the crankshaft and the camshafts, and in the ordinary course the reassembling of the automobile begins at this point. If the car proves to be in generally good condition the refitting of the brasses will be a

simple undertaking for a man of some skill, and the workman who may be engaged to assist the owner of the car in this enterprise should have experience in the scraping in of the bearings.

The crankshaft bearings should be so scraped that the Prussian blue will show strongly at the bearing point in the vertical plane and will disappear at the approach of the joint, disappearing also at the extremities of the bearing, so that the two halves of the brasses, so called, when they are fitted together around the pins, will form a pair of inverted truncated cones, slightly elliptical. It will be understood, of course, that the backing-off process is to be limited to a difference of two or three thousandths of an inch at the outside, and when the bearings are fitted for the last time, and tightened up, the crankshaft should turn quite hard, thus leaving it for a "running" to flatten down the inverted truncated cones formed out of the bearing metal, but this tendency to run hard should disappear within perhaps thirty minutes of constant running under no load. If a neat job is done in the fitting of the crankshaft bearings it will go a long way toward producing a satisfactory result. The reassembling of the motor may progress from this point on, reversing the operation of disassembling, making sure that each part as it goes into place fits properly and that the holding bolts and the nuts thereon are a good fit and that means for locking every nut is provided at the time.

There Is a Considerable Difference Between Overhauling a Car as a Safety Measure and Rebuilding a Worn-Out Automobile

The idea underlying this discussion has for its principle the idea of showing that if the automobile is not worn out the overhauling process is in the nature of a systematic formality as an insurance project and with the expectation that "a stitch in time will save nine." Most men who undertake this sort of thing disassemble the automobile with precipitous haste and the cost of doing the work and reassembling the car under such conditions is at least twice as much as it will prove to be if the disassembling process is conducted with precision and care.

Granting that the taking down of the car is done in the manner as heretofore outlined and that the parts are inspected and refitted, replacing such of them as may be worn out, it becomes unnecessary to complicate the discussion by talking about the putting together of the car again, since it will become a mere inversion of the instructions of the disassembling process. There are some points that cannot be handled in a general discussion, as, in the timing of the valves and in the grinding-in process, but these matters may be handled more advantageously in a specific discussion so that they will be left for separate treatment at the propitious moment.

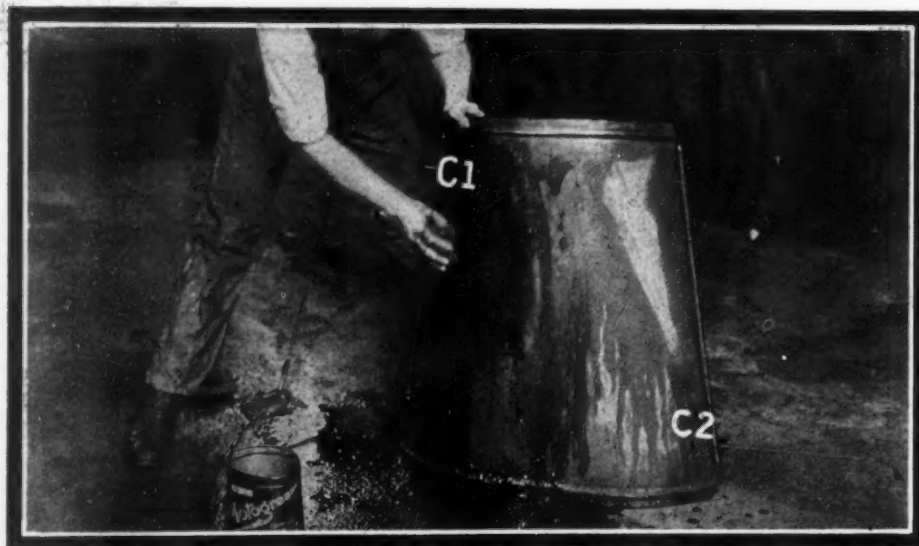


Fig. 9—Dirt shields should be removed from time to time and given a thorough cleaning. Besides protecting the machinery they harbor dirt that finds its way through the cracks and radiator and mixes with the oil. Shields are often attached by means of draw bolts, and unless these are washed out with kerosene they become rusty and filled with mud.

In reassembling the car, if it has not been considerably worn in service, the necessity of doing overmuch fitting will be obviated, and the tools needed under such conditions will not go beyond a very modest list. But if some fitting has to be done, and parts have to be purchased with the chance that they may not be interchangeable, the owner of the car will be confronted by the necessity of providing himself with a limited selection of garage tools. One of the best devices that the market affords for the small garage is a combination anvil and adjustable sensitive

drill, which may be driven by hand-power, and which is useful for the drilling of holes up to 5-8 of an inch diameter. When there is no drilling to be done the sensitive drill standard may be removed and the anvil is then available for the many purposes to which it can be put. There are several styles of this character of equipment, and they range in price from \$8 to \$20.

A small forge with tongs and the customary equipment is almost indispensable, and charcoal for use in the same is a regular product in paper bags at the near-

by grocery store. It is worth something to the novice to know that a piece of steel, if it is bent cold, is so depreciated in the process that its value thereafter for any responsible purpose is in dispute. If a piece of steel is to be bent a slight amount, all that is necessary is to heat it until it shows a blue tinge; while in this state bending is not so detrimental. But if a part must be reshaped, drawn out, or upset it is necessary to heat it beyond the critical point, which borders on cherry-red color, and for this purpose the portable forge is a very valuable equipment.

When the Car Needs Repainting

Upon Circumstances, For Which Adequate Information is Here Offered.

The Final Operation in Putting a Car into Commission, Including Refinishing or Retouching, Depending

FOLLOWING up the rejuvenation of the mechanical portions of the car it is highly desirable that the scars of the past season, which cannot be avoided if one follows his inclination to travel the give-and-take roads of this section of the country, should be eliminated. Bruises and fractures deep and numerous make the work of bringing the car up to a finish a task of no mean importance. The first work consists in cleaning all parts of grease, dirt and miscellaneous accumulations. Then sandpaper the surface of the body with No. 1-2 paper, fetching it in this way smooth and sleek, with all fractures and defects cleaned out. In case of the metal body, scrape over all abrasions, dents and other disfigurements and sandpaper the surface in the same manner as the wood surface is treated.

Beat up some tub or oil ground white lead in turpentine, adding a suitable coloring pigment, and adjusting it finally to carry, say, one part raw linseed oil to six parts turpentine. Apply this to the wood surface with a bristle brush and slick it up nicely to insure uniform and sure drying. For the metal body, first coat, use, for the most part, a negative pigment so far as its action on metal is concerned.

Make it to carry a strong percentage of raw linseed oil and apply to the surface sparingly but with a uniform film of pigment. Let this first coat of surfacer dry thoroughly, after which, this process completed, go over the surface carefully, and with a hard drying putty, fill up all cavities and other defects. Any exceptionally rough places should be draw puttied, or putty glazed, as the work is variously designated.

The main thing in puttying, or in putty glazing, is to round up, fill up, and make the defects as little as possible, or, best of all, eliminate them altogether.

After 24 hours prepare and apply to the

surface a coat of surfacer, or, as it is known to the trade, rough stuff. This can be shop-made or bought ready mixed, requiring, for immediate use, letting down with turpentine to a proper brushing consistency. This consistency, however, is a good bit heavier, or should be, than ordinary coats of paint. If made in the shop take equal parts, by weight, of any good American filler in dry form and white keg lead, working them up to a stiff paste in equal parts of coach japan and rubbing varnish, then thinning with turpentine to the desired consistency. On the whole, however, it is practically as cheap per gallon to buy the rough stuff prepared ready to use, and in this way you save in cost.

Apply four coats of the rough stuff in as many days, laying the first coat off lengthwise of the panels, second coat crosswise, so alternating in laying off, thus securing a more dense and compact body of pigment.

Next take some of the rough stuff and add to it either enough yellow ochre or Indian red to give the pigment either a shade of yellow or red, and, thinning with turpentine, apply over the rough stuff. This serves as a guide coat to enable the painter, when rubbing the surface down with water and artificial pumice stone, or rubbing brick, to judge more quickly and accurately concerning the condition of the surface—when it has been rubbed enough.

The day following this application of "stain" or "guide," rub the surface down to a smooth and level condition free from all blemishes, with the artificial rubbing stone or brick, and water, using this latter medium plentifully. Rub with straight out and return strokes of the arm, holding the stone firmly upon the surface, and keeping enough water on the surface to prevent the stone from gumming up and scratching the work.

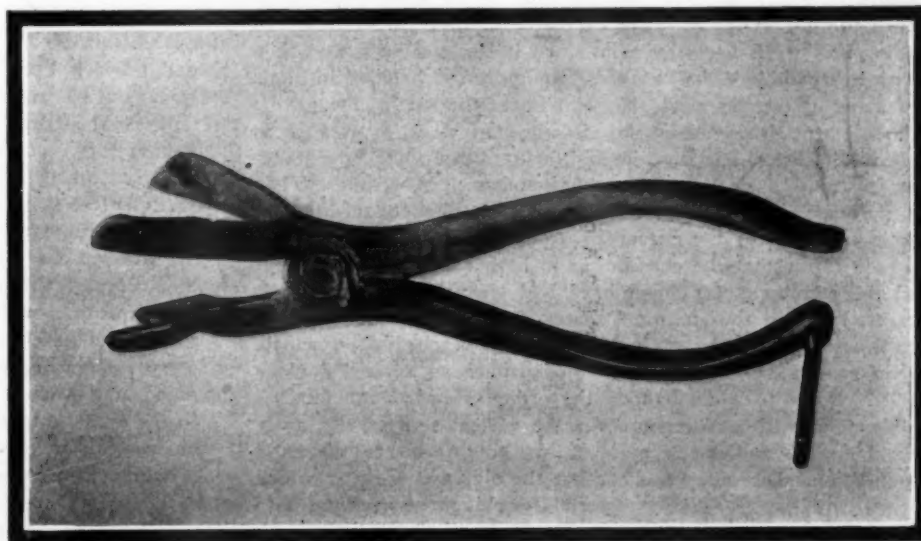


Fig. 10—Cleaning and grinding in valves is often deferred owing to the difficulty experienced in removing the valve springs. The valve remover shown in this illustration works in the opposite manner to a pair of pliers in that by compressing the handle the jaws open and so lift the spring cups.

Circular motions of the stone during the rubbing process endanger the quality of the surface. After completing the rubbing process wash with clean water and stand the surface aside overnight for the elimination of moisture.

Next sandpaper the surface very lightly with No. 00 sandpaper, dust off and apply the desired color coat. With one coat of color and a coat of varnish-color, or with two straight coats of color, two coats of rubbing varnish, and a coat of finishing varnish the body surface should be sleek and trim and quite brilliant enough to give a good account of itself in any company.

Meanwhile, the chassis will require attention. After cleaning up thoroughly go over the parts carefully, and all fractured and shattered, or lightly bruised places, touch up with a pigment composed of, say, three parts white keg lead and one part coloring pigment of any preferred shade, beating the mass up in turpentine containing raw linseed oil in the proportion of one part oil to four parts turpentine. After three days sandpaper the surface of the chassis throughout, and apply with a camel's hair brush a coat of either white lead and some other pigment, or other surfacer, whipped out to a smooth working consistency in turpentine, fortifying the mass with raw linseed oil in the proportion of one part oil to seven parts turpentine. Brush the pigment out clear and fine, and after forty-eight hours putty all surface defects of whatsoever nature with the hard drying putty previously described. Should any coarse patches of surface exist, thin some of the hard putty down with turpentine and glaze all such parts. Let the putty dry for a couple of days and then sandpaper, avoiding, meantime, cutting through the first coat of surfacer. Upon working the putty down to a perfect level with the general surface, clean and dust off carefully and apply a final coat of surfacer composed of white lead and some desired coloring pigment whipped out thin in turpentine, with a bit of raw linseed oil added, say, one part oil to ten parts turpentine, using a camel's hair brush to lay on the surfacer.

Lightly sandpaper this coat in due time and apply color, then varnish-color or glaze, stripe, and over a coat of clear rubbing varnish, finish.

The badly shattered and worn job is the sort of work which the painter dislikes, it being difficult, as a rule, to get a price sufficient to adequately compensate him for services rendered. The old paint is found scaling and flaking off and the surface shows numerous gouges and fractures. The first step consists of burning the old shaky, flaky finish entirely off, using a burning torch or lamp. These lamps use gasoline, and in case their employment renders insurance policies invalid, procure a small rubber tube of the required length, and equipped with the proper devices, one end with small burning point and the other with attachment for gas fixture, affix to the nearest gas fixture, and with this medium—nowise equal in power to gasoline, to be sure—proceed to burn the old, crispy garment of pigment from the surface. In doing this work heat the paint until it becomes soft, and then with a broad-blade, half-elastic scraping knife, held at an angle of about 45 degrees, push the point under the soft paint and lift the pigment from the surface, doing the work as cleanly as possible. After burning the old paint away, sandpaper thoroughly until a clean, solid wood foundation is secured. Then prime with either raw linseed oil and some pigment medium, or with some one of the numerous excellent patent primers.

It is rarely that the chassis has to be burned off. Simply cut all the running parts down hard and clean with coarse sandpaper, scraping the shattered places down with a steel scraper until a sound, healthy surface condition is reached, after which, upon sandpapering, apply a coat of primer as advised for the body. Bring to a finish upon the order of procedure detailed.

To paint without burning off, take a steel scraper, dig away all the scaly and shelly pigment, working down to the solid foundation. Dig out, and clean out the old cavities, after which prime with some reliable material, working the medium into all the holes and fractures. Next apply some second coat material made up of white lead, raw linseed oil, turpentine, and a coloring pigment. Let this coat dry firmly and then apply the

following: Dry white lead, three parts; best bolted whiting, one part. Beat to a consistency which lets the pigment work freely from the point of the putty knife in equal parts of brown coach japan and rubbing varnish, letting the mass out a bit with a sprinkle of turpentine. Take a broad knife and plaster the putty over the surface solidly, drawing it out smooth and to a uniform depth under the edge of the knife. Obliterate and face up all inequalities. Permit the putty to harden up several days—four, at least, and then with a rubbing brick or stone dipped in raw linseed oil proceed to rub down the mass, working it out gradually to a smooth level surface.

Glaze with this same putty and face up all the rough parts of the chassis and in due time bring the proper surface with sandpaper. Let the body surface, after rubbing, stand 24 hours before applying the first coat of color.

Refinishing at Small Cost

Showing How to Rejuvenate the Car Quickly and Well, on a Comparatively Small Outlay

THE complete outward renovation of a car is sometimes too costly an operation as outlined. Those who may desire a cheaper and quicker method can begin with the body, presumably of aluminum or some other metal, and have it gone over with a patch of emery cloth, or emery paper, or a fine wire brush, and, in the absence of these mediums, with some coarse sandpaper. Thus rid the surface of foreign substances and condition it to receive and hold the pigment applied to it.

As to the best available primer. Use, if opportunity affords, a purchased ready-to-use metal primer, to be applied with a soft point round or oval bristle brush, the coat being brushed out smooth and uniform. If shop-prepared, use 2 parts raw linseed oil and 3 parts pure turpentine, to a pint of which mixture add a teaspoonful of pale drying japan. For coloring matter and to give body to the primer add enough oil ground lead colored in the direction of the to be finally chosen color. Another primer that some painters have found to work out very strong and well upon the metal surface consists simply of elastic finishing varnish brushed out thinly over the surface.

As soon as the primer is dry, good and secure, beat up some keg lead in 1 part raw linseed oil and 6 parts turpentine, give it the proper coloring, and apply with a soft chisel point brush.

After allowing for secure drying proceed either with a ready prepared knifing material, of which there are numerous makes, or with a shop-mixed one prepared of 3 parts dry white lead and 1 part best bolted whiting, worked into a plastic glazing condition in equal parts of rubbing varnish and coach japan, letting the mass down a bit with a little pure turpentine. Apply with a broad 1-2-inch French scraping knife, half elastic, working the pigment out so uniformly smooth and fine as to necessitate little if any sandpapering.

Permit this coat of knifed-in surface to dry for 48 hours, at which time, using first No. 1 sandpaper and last No. 0 to polish with, fetch the work up to a smooth, glassy condition.

Over this foundation lay a coat of color ground work, or, in other words, a coat of color to serve as the ground or foundation color. Prepare this color by using 1 part raw linseed oil to 5 parts turpentine, which, in case of a japan ground color, will furnish requisite elasticity, durability, and a ground color devoid of gloss yet not drying out to a dead appearance—the latter to be avoided at this point in the finish.

In the event of using lake pigments for the final color the next coat over this preparatory ground color should be a coat of the lake whipped in turpentine to dry flat. Then over this use the lake floated in elastic rubbing varnish. When the color is of the ordinary opaque pigment, or, at most, semi-opaque, such as, for example, ultramarine blue, wine color, or carmine, make a varnish color for the opaque pigments, consisting of 1-4 pound

of color to 2 pounds of varnish, and for the semi-opaque or transparent pigments, following a solid ground, use 3-4 ounce of color to 1-8 gallon of varnish.

After 36 hours this varnish color, or the transparent glaze, will have dried so that it may be lightly rubbed with water and pumice stone flour to the extent of flicking away any dirt nibs, an elastic body-finishing varnish of the very best grade obtainable should be applied.

For the next coat reduce by one-half the amount of color used in the varnish and apply freely to the surface. Let this coat stand two days, at the expiration of which time again rub with water and pumice stone flour, wash up, stripe and apply such other ornamentation as may be desired. Then apply a coat of clean rubbing varnish. After three days rub this coat moderately with water and pumice stone flour, wash up and finish with an elastic body-finishing varnish of the very best grade obtainable.

Bring the chassis meantime along practically the same lines, using one coat of primer, then a coat of surfacing pigment containing enough raw linseed oil to insure adequate elasticity, upon which foundation use the knifing putty to level up the inequalities of the surface and to "face up" any other existing defects. Sandpaper this body of pigment down sleek and smooth, after which apply one coat of flat color, then one coat of transparent glaze or one coat of varnish color as the requirements of the work may indicate, upon which, in due time, after breaking down the gloss with a light rub-over with a soft sponge, moist and saturated with pumice stone flour, stripe, and apply one coat of clean rubbing varnish. Give this coat plenty of time to dry, three days or more if possible, then surface thoroughly with water and pumice stone flour, wash up sleek and clean and finish with an elastic chassis finishing varnish.

Systematic Trouble Hunting

By a Process of Elimination Treating with the Known Quantities the Unknown Quantities Are Discovered by the Mere Fact That They Are What Is Left



THIS is the time of the year when the man who owns an automobile has his mind on the troubles that he is likely to experience when he puts the car in commission for a season's work, and it is half the battle to eliminate superstitions confining all effort to the systematic finding of such trouble as there may be, without looking for the same in the places where it cannot be found.

The plan as here given has for its foundation the taking into account of the known quantities, and by deduction reach the conclusions which will make it possible to detect and deal with the unknown quantities.

CASE No. 1. WHEN THE MOTOR WILL NOT RUN

- If the ignition is in working order;
- If the compression is normal;
- If the carbureter is working properly;
- If the exhaust valve is tight;
- If the inlet valve is tight;
- If the gasoline supply is adequate;
- If the gasoline pressure is sufficient;
- If the gasoline is free from water;
- If the gasoline is of the right quality;
- If the gasoline supply valve is open;
- If the gasoline piping is not stopped up;
- If the intake manifold is tight;
- If the carbureter control system is not deranged;
- If the cylinders are properly scavenged;
- If the timer is in good order;
- If the magneto appears to be in working order.

IT STANDS TO REASON—

- That the timing system is deranged;
- That the points of the spark plugs are separated too much;
- That the wiring is defective, as an open or short circuit;
- That the half-time gears have been removed and put back out of proper mesh;

- That the contacts of the timer are not good, due to weak springs; or accumulations of dirt if the brushes are not worn out;
- That the battery is run down, or the magnets of the magneto are demagnetized;
- That the camshaft has been taken out and put back wrong;
- That the order of firing has been deranged;
- That one or more of the valves after they are opened by the cam action are in a sticking condition and stay open;
- That the relation of gasoline to air of the carbureter is poor, although the carbureter appears to work all right;
- That the spark advance mechanism is either deranged or the spark position is wrong for the starting and running of the motor.

CASE No. 2. THE MOTOR FAILS TO OPERATE

- If the ignition is in working order;
- If the compression is normal;
- If the exhaust valves are tight;
- If the inlet valves are tight;
- If there is gasoline in the tank;
- If the gasoline is free from water;
- If the gasoline supply valve is open;
- If there is no impediment in the gasoline pipe;
- If the intake manifold is tight;
- If the carbureter control system is in good order;
- If the gasoline tank pressure is sufficient;
- If the cylinders of the motor are properly scavenged;
- If the cylinders are not fouled with cylinder oil;
- If the camshaft has not been deranged;
- If the half-time gears are meshing properly;
- If the timer is not fouled by grease;
- If the motor will start after scavenging and timing.

IT STANDS TO REASON—

- That the carbureter float is punctured (if of copper);
- That the carbureter float is lousy (if of cork);
- That the gasoline level is too low;
- That the gasoline level is too high;
- That there is a leak around the float-bowl;
- That the carbureter nozzle is stopped up;
- That the needle valve in the nozzle is out of adjustment;
- That the needle valve is worn;
- That the gasoline strainer is clogged up;
- That the balance levers of the float are stuck;
- That there is an impediment in the carbureter passages;
- That the air valve adjustment is awry;
- That the automatic valve spring is weakened;
- That there is lost motion in the valves somewhere;
- That one or more of the valves stick;
- That there is a leaky gasket at a joint;
- That the gasoline is not of the customary specific gravity;
- That water is lodged in the float-bowl;
- That the air vent of the float-bowl is stopped up;
- That the float sticks in its guides;
- That liquid gasoline lodges in the intake manifold;
- That a new nozzle has been put into the carbureter and it is too small;
- That a new nozzle has been put into the carbureter and it is too large;
- That the method of heating the auxiliary air is insufficient;
- That the carbureter is getting too much air;
- That the motor is not being supplied with the proper mixture.

CASE No. 3. THE MOTOR REFUSES TO OPERATE

- If the ignition system is in working order;
- If the carbureter appears to be in working order;
- If the gasoline supply is adequate;
- If the compression is good;
- If the motor cranks freely;
- If the motor starts with difficulty;
- If the motor stalls when it is given work;
- If there is an alarming absence of power.

IT STANDS TO REASON—

- That the compression is poor;
- That there is a leak in the inlet valve;
- That the exhaust valves are not tight;
- That the piston rings are worn;
- That the cylinders are elliptical;
- That the valve stems are deformed;
- That the valve stems stick in the guides;
- That the valve seats are pitted;
- That the valve springs are weak;
- That the tappet adjustments are awry;
- That there is a crack in the cylinder;
- That the piston rings are out of order;
- That the piston rings are gummed up and stick;
- That the cylinder head covers are not tight;
- That the piston head is cracked;
- That the spark plugs are not screwed in tight;
- That there is an obstruction in the intake passageways;
- That a cam is adrift on the camshaft;
- That the half-time gears are slipping on the shaft;
- That the tappet rods stick, or some other mechanical imperfection prevents the valves from closing.

It is proposed to present a series of these cases representing the various conditions under which trouble may be found by this process of elimination, and it will be understood by the reader that after the known quantities are scheduled any one or all of the unknown quantities may be at the seat of the trouble. In looking for trouble, it will be desirable to take up the unknown quantities in the order of their naming, or in the order of convenience, considering a given design of motor, and transfer them to the column of known quantities, ultimately discovering the real difficulty. It is a wiser plan to thus proceed than will be true of a haphazard idea with the probability that the real difficulty will escape detection.

Cylinder Evidently Not Properly Designed

Editor THE AUTOMOBILE:

[2,559]—In overhauling my motor I ground the valves in and after the same was reassembled I soon discovered that one of the exhaust valves was leaking badly, and upon further examination of the same I was much surprised when I observed that the seat had a crack in it. What do you think was the difficulty with this cylinder, and how am I to apply a remedy?

G. J. G.

Germantown, Pa.

Referring to Fig. 1, you will see that the waterjacket does not extend all around the valve seat with an equal distance from the water to the seat at every point. As a result of this construction the valve seat is kept cool at points adjacent to water, and it heats up excessively at other points. The cracking is due to unequal expansion. If you will examine Fig. 2 you will observe that the waterjacket passes down to a point below the plane of the valve, thus bringing the exhaust transfer port a little lower down than would be true in the construction, as shown in Fig. 1, but it offers the advantage of a uniform sheet of water all around the valve seat. In your particular case there seems to be no better remedy than to purchase a new cylinder.

Oil Is Distributed by Centrifugal Force to the Bearings

Editor THE AUTOMOBILE:

[2,560]—My motor is provided with a crankshaft with oilways drilled from the cheek to the center of the pin, and a plate with a curl at the periphery is so placed as to prevent the oil from passing out of the bearing and down into the crankcase in the manner as shown in the sketch (Fig. 3), but I do not quite understand the working of this plan, and I come to you for the explanation.

CURIOUS.

Joliet, Ill.

The idea is a very simple one that you will understand perfectly if you give the

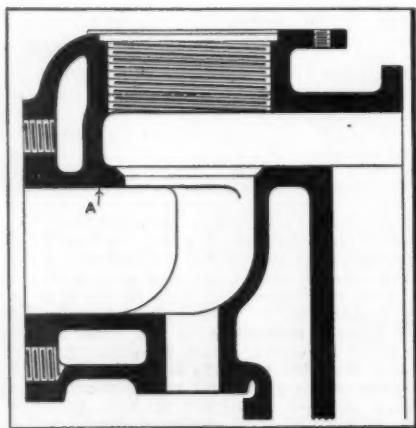


Fig. 1—Section of a cylinder, showing lack of uniformity of the water supply around the seat of the valve

subject a little thought. The oil after it passes through the main bearing contracts with the baffle plate, runs down the surfaces and under the influence of centrifugal force it enters the orifice of the oilway which is drilled diagonally so that the radius of the oilway is increasing from the point of entrance of the oil to the point of the outlet of the same on the surface of the pin. Since the crankpin rotates the oil is transferred by centrifugal force and is thrown against the connecting rod bearing where it smears over the journal surfaces and does its allotted work.

The Scoop Is a Part of the Splash System of Lubrication

Editor THE AUTOMOBILE:

[2,561]—My motor is provided with a splash system of lubrication but it does not work satisfactorily; first, due to the fact that the cylinders become fouled if I use enough lubricating oil in the crankcase to serve for the whole day, and, second, the

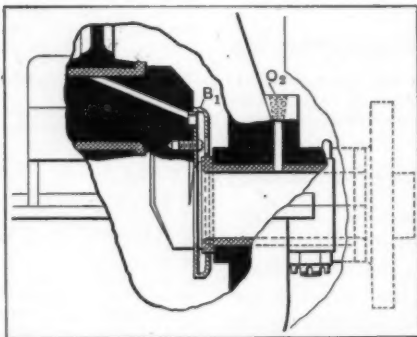


Fig. 2—Section of a crankcase, showing the crankshaft in place and a baffle plate with a curled edge adjacent to the cheek of the crankshaft, with a diagonal hole drilled in the pin passing through the cheek for purposes of lubrication by centrifugal force

motor runs dry if I try to limit the supply of lubricating oil. Can you offer a remedy?

TROUBLE.

Richmond, Va.

Referring to Fig. 4, it will be observed that a little scoop is placed in the cap of the connecting rod in such a way that when the connecting rod traverses its orbit the scoop dips down into the lubricating oil and a quantity of the same enters the orifice of the scoop and passes up through a hole which is drilled in the cap to the bearing to be lubricated. With scoops on the end of the connecting rod in the manner as shown the rod proper does not strike the surface of lubricating oil, hence excessive splashing is avoided. The scoop dips into the oil, of which there may be a considerable depth if space is available, and the splash system so contrived works satisfactorily. The probabilities are that the lower half of your

What Some Subscribers Desire to Know

The Editor invites owners and drivers of automobiles who are subscribers to THE AUTOMOBILE to communicate their automobile troubles, stating them briefly, on one side of the paper only, giving as clear a diagnosis as possible in each case, and a sketch, even though it may be rough, for the purpose of aiding the Editor to understand the nature of the difficulty. Each letter will be answered in these columns in the order of its receipt. The name and address of the subscriber must be given, as evidence of good faith, adding a nom de plume if the writer desires to withhold his name from publication.

crankcase is so designed that you have no room therein to take advantage of this idea, but it would be possible to cut away the crankcase around the girth, making a channel for the oil so that the scoop can then be taken advantage of, and a reasonably handy coppersmith will be able to fit copper ditches in the openings that are formed by cutting the metal away.

Depends Upon Design, Construction and Circumstances

Editor THE AUTOMOBILE:

[2,562]—Will you tell me what per cent. of power is lost in transmitting the power to the rear wheels of a friction-driven car; also what per cent. is lost by a geared transmission? Why is it that more manufacturers do not incorporate the friction drive?

Windsor, Mo.

A SUBSCRIBER.

Referring to the friction drive, the loss of power depends upon the coefficient of friction between the disc and the transmitting wheel, and upon the radius of contact of the transmitting wheel upon the disc. The traction requirement in pounds may be found as follows:

$$H.P. = \frac{2\pi R S P}{33,000} = \text{horsepower};$$

Hence,

$$P = \frac{H.P. \times 33,000}{2\pi R S} = \text{pull in pounds},$$

When,

$$2\pi = 6.28.$$

R = Radius in feet.

S = Speed in revolutions per minute.

A study of the above formula goes to show that the transmission disc will do its best work when the transmission wheel is in contact in the region of the outer periphery of the disc. As the radius of contact decreases, the traction in pounds must be increased accordingly, and the time may arrive in the working of the friction disc when the traction requirement will exceed



What Other Subscribers Have to Say

The Editor invites owners and drivers of automobiles who are subscribers to THE AUTOMOBILE to communicate their personal experiences for publication in these columns for the worthy purpose of aiding brother automobilists who may be in need of just the information that this process will afford. Communications should be brief, on one side of the paper only, and clearly put, including a rough sketch when it is possible to do so, and the name and address of the writer should be given as evidence of good faith, adding a nom de plume if the writer desires to withhold his name from publication.

the coefficient of friction, in which event slipping is the normal expectation. To whatever extent slipping transpires it detracts from the efficiency of the system, and the only way to find out what does take place in a given example is to test the same and note the relation of the coefficient of friction to the tractive requirement.

Referring to positive drives as represented in gear transmissions, confining the discussion to square cut gears in conjunction with a bevel drive, it is enough to say that the loss will be in the region of 4 per cent. per square-cut tooth contact and about 6 per cent. per bevel-tooth contact. Assuming that the design includes the transmission of power through one bevel gear, the first loss will be due to the square-cut gear contact and the second loss will take place in the bevel-gear contact. If the motor delivers, say, 20 horsepower, the following will then hold.

For the square-cut gear:
 $20 \times 0.96 = 19.2$ horsepower,

And

$19.2 \times 0.94 = 18.04$ horsepower.

The above figures take no account of other losses as in bearings or in the live rear axle, not forgetting that the loss at the point of contact of the tire with the road is very great under certain conditions, reaching 100 per cent. when the wheels slip.

The "Legitimate Prey" Gets Unruly Betimes

Editor THE AUTOMOBILE:

[2,563]—In overhauling a car I find the ball bearing separator in my front bearing of the crankshaft broken. I have asked the representative in this country to send me another separator so that I may put it in good shape, and he says to send it to him and he will send it to the factory to be repaired, or he will give me a new bearing for half price. This I think is outrageous as it only takes a very simple form of separator and a dozen small screws to put

in the new one. A new bearing costs, according to the catalogue, \$36.40; the half of that is \$18.20, which I would be paying for a new ring which is worth about 50 cents. If you know of a way of repairing or substituting a ring, kindly let me know.

A SUBSCRIBER.

Richmond Hill, L. I.

From the beginning of the "machinery age" down to the present time the owner has always been regarded as legitimate prey and in addition to having to pay heavily for repair parts, it has been his misfortune to meet with poor success in the matter of the prompt delivery of repair parts. Why the owner of a car should have to buy a whole ball bearing merely because he needs a new separator is difficult to say. If the separator of a ball bearing costs half the price of a new ball bearing, or \$18.20, a curious-minded person would like to know what it would cost if it were made of gold. The doctrine of "legitimate prey" is a fair one up to a certain point, but it ceases to be fair when a nickel's

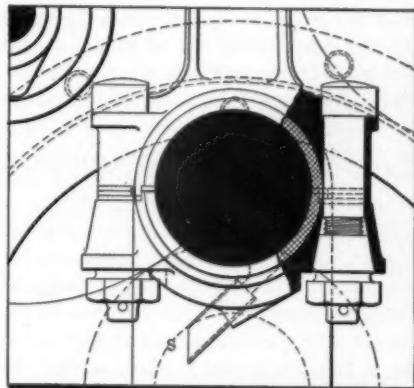


Fig. 4—Section of a crankshaft through the connecting rod pin adjacent to the main bearing on the connecting rod, showing a scoop in the cap which dips up the oil and lubricates the bearing

worth of brass or other plebeian metal dresses up in an \$18.20 costume, and parades around in front of the man who would be able to run his automobile were it not for the defect in the separator of the ball bearing, which defect might be one that the maker should make good without parley. At all events, the particular owner of the automobile in this case will not be a good "walking advertisement" for the maker of the ball bearing if the latter persists in charging \$18.20 for a separator.

Which Is the Better, Four or Six-Cylinder?

Editor THE AUTOMOBILE:

[2,564]—As a subscriber to your paper, I would like to make the following inquiry

under the heading, "What Subscribers Desire to Know," provided you answer it quickly, for I am in the market for a car.

Which is the best car to own, four or six cylinder, everything considered, the price in both cases to be the same. About how much more will it cost (if any) to maintain a six-cylinder machine, outside of gasoline and oil? About how much more of these will it require to run a six-cylinder machine?

E. P. HARVEY.

Northampton, Mass.

A good four-cylinder motor would be superior to a poor six-cylinder, and vice-versa.

Shock Absorbers Serve a Certain Useful Purpose

Editor THE AUTOMOBILE:

[2,565]—Do you think shock absorbers on a car save the car, engine and tires, enough to warrant their expense on country roads that are only fair, and do they make the car ride easier? I have had shock absorbers recommended.

B. S. ADAMS.

Hibbing, Minn.

There is no difference between the use of shock absorbers on an automobile, and bumpers between two freight cars. The energy which has to be absorbed in the arresting of the motion is so taken up by the bumpers on the freight cars or the shock absorbers as they are used in automobile work. In relation to the selection of shock absorbers, if you have no experience, you might consult some of your brother automobilists and benefit thereby.

Economy in the Use of Oil Is Desired

Editor THE AUTOMOBILE:

[2,566]—My motor works very well excepting that the quantity of lubricating oil required seems to be greater than that needed in other makes of motors, and in

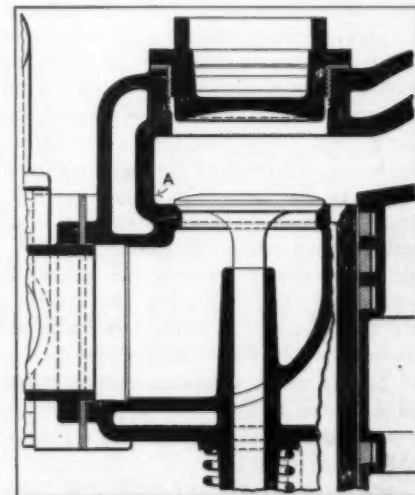


Fig. 2—Section of a cylinder, showing how water is circulated under equal conditions at all points around the seat of the valve

view of the fact that I propose to buy a new car this year, I wish to school myself in the several particulars that will permit me to use good judgment at the time of making my next investment. The lubricating problem is uppermost in my mind, and I wish to know whether or not it is feasible to use the oil over and over rather than to have it go to waste.

ECONOMY.

Cincinnati, Ohio.

Referring to Fig. 5, you will see that after the oil passes through the bearing, thus doing the work which is to be expected of it, it passes down through the oilway W₁, thence to the sump in the lower

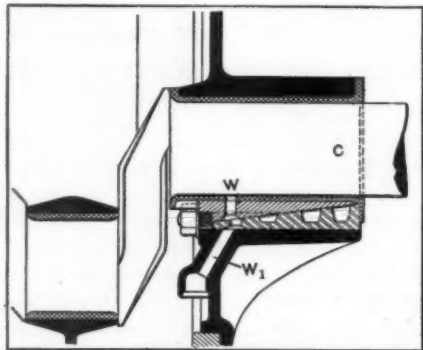


Fig. 5—Section of a crankcase through the main bearing at one end, showing how the oil passes from the bearing to an oilway and then to a sump in the lower half of the crankcase

half of the crankcase, where it is filtered and pumped up again to the higher level, when it is ready to do its second cycle of work. There is no reason why oil should not be used over and over through many cycles on condition that it is filtered as often as it comes back to the sump, and with the further proviso that new oil be added from time to time to make up for the loss, which should be limited, and to maintain the quality of the lubricating medium up to a reasonable standard of slipperiness.

Chips From the Sliding Gears Get Into the Bearings

Editor THE AUTOMOBILE:

[2,567]—I am overhauling my automobile prior to putting it on the road when the weather permits, and in examining the annular-type ball bearings in the transmission gear system I find that they are considerably worn, and some of the balls are gashed, due to the fact, as I think, that chips from the gears are free to enter the ball bearings, thus doing the damage noted. I send you a sketch showing the scheme of construction, and indicating that there is very little room, but I am in hopes that you will be able to offer a suggestion such as will permit me to afford protection to the ball bearings against the effect of chips from the gears.

HIGH SIGN.

Albany, N. Y.

Taking your sketch as a basis, Fig. 7 was made showing the ball bearing end of the shaft B and the disc of felt F with a plate of aluminum A over the felt, holding the

plate in place by means of screws S₁ and S₂, of which there should be six around the periphery. The aluminum may be split in two halves, made from a plate about 1-16 of an inch thick, and the piano felt should be of a good grade about 1-8 of an inch thick. The fact that the plate is split will have no effect on the tightness due to the squashing down of the piano felt which will squeeze into the joints when pressure is put upon the screws. This class of piano felt is noted for its ability to do work of this character without wearing out, and the joints will stay tight for a long time. Lubricate the ball bearings with a fine grade of vaseline.

There Is Room Enough for an Outboard Support

Editor THE AUTOMOBILE:

[2,568]—I have always considered that the differential gear system in a live rear axle is a great nuisance, due to the fact that the housing of the differential takes up so much room that there is no place to put an outboard bearing for the bevel pinion. What is your opinion of this matter?

SUBSCRIBER.

Newark, N. J.

Putting an outboard bearing in the place that you name is not beyond the ingenuity of a designer of just a little skill, and Figs. 6 and 8 are offered as an indication of the fact that automobiles are so made by those who consider it necessary to employ an outboard bearing for the bevel pinion.

There Are a Hundred Questions That You Do Not Ask

Editor THE AUTOMOBILE:

[2,569]—How much superiority does the incorporation of vanadium steel impart to a motor truck?

What is chrome vanadium steel?

How important for a truck is the "differential lock"?

G. W. PORTER.

Agawan, Mass.

A proper answer to the intent of your inquiry would leave out much of any reference to the questions that you do ask, but would include a long statement of the facts in relation to the fabrication of steel and to the problems of alloying. Take, for illustration, your first question respecting the superiority of vanadium. This question might be answered by saying that those who recommend vanadium in steel point out that it will poison the product unless it is used sparingly under precise conditions. With this possibility, it is no longer safe to venture the opinion that steel is superior simply because it holds vanadium, and it remains to be said that the steel must be properly fabricated in view of its composition, and for its intended purpose.

Chrome vanadium steel is steel holding chromium and vanadium. This steel is used in the manufacture of ball bearings. If it carries about 90 points of carbon, per-

haps 1 per cent. chromium, and a tinge of vanadium, if it is otherwise well made, it will be a good product to employ.

The differential lock would come in handy in the event that a differential gear is stripped or otherwise disabled sufficiently to prevent the differential system from weighing out the torque of the motor to the road wheels. With a poor type of differential gear, the locking device becomes of great importance, but if you can be sure that the differential system is stout and lasting the requirement of a locking device becomes less pressing.

Everything Depends Upon the Nature of the Contract

Editor THE AUTOMOBILE:

[2,570]—Will you please inform me whether the owner of an automobile is responsible for damage or injury done while his machine is in use by one to whom it has been loaned or rented?

CHARLES R. OTIS.

Yonkers, N. Y.

In the eye of the law the man who owns the automobile at the time of the doing of damage may be held responsible for the loss resulting. If the original owner of a car leases the same to a second party, he ceases to be the operating owner, and if the contract is a clear one it is the operating owner who will have to be responsible for

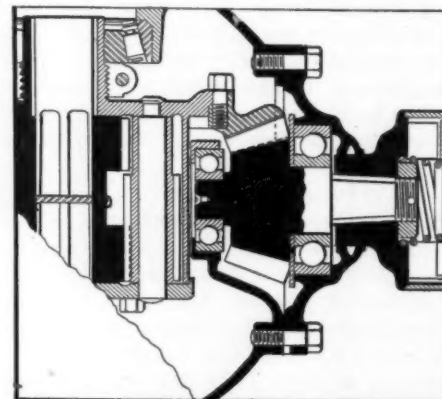


Fig. 6—Section through a bevel drive, showing an annular type ball bearing on both sides of the bevel pinion and a dish support for the outboard bearing

any damage that may be done by him with the car during the operating life of the contract. If the operator of a car can be construed as being the mere agent of the rear owner, however, it then follows that the owner of the car will be held responsible for the act of his agent.

Wishes to Revamp a Mohair Top

Editor THE AUTOMOBILE:

[2,571]—I am a subscriber to THE AUTOMOBILE and would like to know how a dirty and faded mohair top can be made presentable.

H. A. HANEY.

Pittsburg, Pa.

Will some experienced maker of tops supply information on this subject?

Last Week's Paper Gave Information Desired.

Editor THE AUTOMOBILE:

[2,572]—As a subscriber to your magazine I would like your advice as to the best solution to use to thoroughly clean out radiator and water jackets after using alcohol during the winter to prevent freezing.

A. C. FIELD.

Pelham Heights, N. Y.

It was pointed out in last week's paper that a solution of washing soda put into the radiator and heated up by running the motor would remove foreign matter from the water system. Details of the method were given in full.

All Lamp Makers Offer This Option

Editor THE AUTOMOBILE:

[2,573]—I have the honor to request the address of someone who will finish auto lamps in gun metal.

A. H. SCATTERGOOD.

Whitehall, N. Y.

Wants Name of Maker of Offset Six-Cylinder Motor

Editor THE AUTOMOBILE:

[2,574]—I beg to inquire if you can inform me if there are any manufacturers of six-cylinder cars using offset cylinders. Is

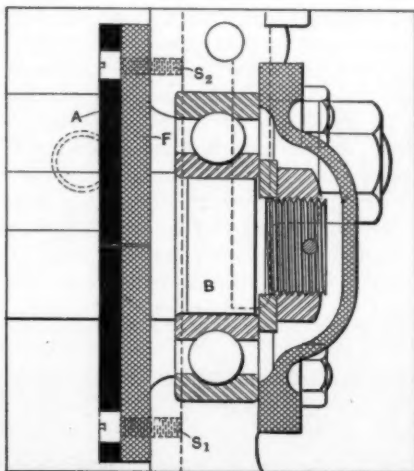


Fig. 7—Showing an annular type ball bearing at one end of the gearshaft and a scheme of packing to keep vaseline within the ball bearing and to exclude chips from the gears

there any reason that an offset could throw a six-cylinder engine out of balance?

N. FOSS.

Jamaica Plain, Mass.

The Speed of the Dynamo Must Be Suitably Regulated

Editor THE AUTOMOBILE:

[2,575]—As I am a constant reader of THE AUTOMOBILE, will you please tell me through your columns how I can put a dynamo on my car so that it can be used for ignition as well as lighting purposes. Can it be used through the coil for ignition,

and if it can, how shall I wire for lights?

H. O. EGGLESTON.

Forsyth, Mont.

An ordinary shunt-wound dynamo electric machine cannot be attached to an automobile motor for purposes of lighting and ignition work, due to the fact that the speed of the automobile motor is a variable over a wide range, and the voltage of the dynamo will change with the speed. It has been found in practice that a means for regulating the speed of the dynamo is necessary in view of the changing character of the speed of the driving motor.

Battery Would Have to Be Recharged at Frequent Intervals

Editor THE AUTOMOBILE:

[2,576]—Will you kindly give me a diagram for wiring side and tail lamps with switch from storage battery? Would a 6-volt, 40-ampere battery give satisfactory service for the above?

SAMUEL M. SEFF.

Lee, Mass.

The 40-ampere, 6-volt battery would serve for the lighting of the side and tail lamps, but the energy stored in the battery would not be sufficient to do this lighting for a very great length of time, and the battery would have to be removed and recharged as the result at quite frequent intervals. It would be desirable under the circumstances to purchase two such batteries and have one of them undergoing charge while the other is discharging in the lighting service. A wiring diagram would be of small value, due to the fact that the particular switch that might be selected would have to be wired according to its construction. In purchasing the switch from a supply house, a wiring diagram to suit the particular switch selected may be had from the supply man.

Conflicts with Modern Theory of Lubrication

Editor THE AUTOMOBILE:

[2,577]—I have been mixing one pint of lubricating oil with five gallons of gasoline. This seems to materially assist the lubrication, but the engine seems harder to start than it did before. Is it not true that the addition of oil will lower the specific gravity of the gasoline, and will this interfere with the smooth running of the engine?

MURRY FAHNESTOCK.

Allegheny, Pa.

Certainly the addition of lubricating oil to gasoline offers no great attraction from the point of view of the service that gasoline is intended to render. On this count, then, the lubricating oil should not be added to the gasoline.

From the point of view of good lubrication, a continuous unbroken film of the lubricant is what is wanted, but a drop of gasoline in the field of the lubricating oil will break the film, thus destroying its con-

tinuity. From the point of view of lubrication, then, gasoline is not a good adulterant for lubricating oil.

Looking for a Kelsey Motorette

Editor THE AUTOMOBILE:

[2,578]—Would you kindly inform us as to what company or companies manufacture a three-wheeled vehicle with power furnished by a gas engine? We are interested in finding one which will serve to deliver mail and packages, but which is not very heavy. S. E. JOHNSON COMPANY.

Cornell, Ill.

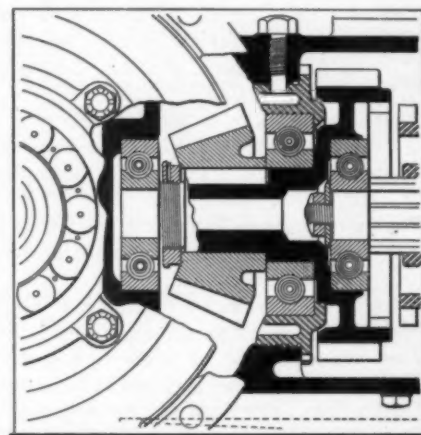


Fig. 8—Example of a bevel drive, showing the plan of placing annular type ball bearings at both sides of the bevel pinion

This three-wheel type of automobile is made by the C. W. Kelsey Mfg. Co., Hartford, Conn.

Anything That Translates Energy and Furnishes Power Is a Motor

Editor THE AUTOMOBILE:

[2,579]—Will you kindly let me know of an internal combustion engine such as is used on automobiles can be properly called a motor?

HUGH K. O'REILLY.

Ardmore, Pa.

Another Defect Discovered in the Callan Law

Editor THE AUTOMOBILE:

[2,580]—Some one should give the State a "roast" for the inferior number plates that are being put out. They are a disgrace to any good car, and if I owned a \$5,000 car I would refuse to put them on my automobile.

W. M. F.

East Orange, N. J.

Wants the Address of a Maker of "Gradometers"

Editor THE AUTOMOBILE:

[2,581]—Have you the address or addresses of reliable firms who make or sell "gradometers"? If so, if agreeable to you, I shall be glad to receive this information. Please state which you know to be the most practical instrument. J. C. SWEPPENHISER.

Bloombsburg, Pa.

It Stands to Reason That the Man Who Desires to Purchase a Good Automobile Has but Few Chances to Take, but Why Take Any of Them?

That the man who is incapable of co-operating is only fit to pull a one-horse wagon.

That team-work is the greatest invention of the age; the product of a well-matched team is always good.

That the more capable member of a team is not submerged in the process; the team as a whole pulls a greater load due to his presence, and this fact is too apparent to be concealed.

That the man who is least capable is a qualified expert at finding trouble in the performance of his neighbors.

That amiability is a great asset; antagonism never approaches a streak of sunlight.

That men want to know just what they are to do under a given set of conditions; some mathematician must contrive the requisite formula.

That in the process of segregation, which is ever going on, the froth comes to the top.

That the exchange of ideas is a healthy undertaking; this is not to say that a tyrant is to dominate a situation.

That a dominator soon has the whole of the desert to himself.

That this is the day of reason rather than of rule.

That basic principles must not be violated in the building up of a plan.

That some individuals forget that a plan will show all its defects even though they are so hidden that they are only perceived by the piercing gaze of the man of skill.

That there is no school of method—just tell the truth.

That the best way to sell a device is to find a purchaser for it.

That the quickest method of uncovering a purchaser is to accurately describe the device in the medium that he reads.

That no man can accurately describe that which he does not understand.

That the advertising copy that will fit any automobile made is a misfit for every automobile made.

That a man has a right to grip as hard on the trade as he sees fit if he uses delivered satisfaction as the mastic.

That an agent could not glue himself to an elephant's back fast enough to hold on were he to purposely land misfits for a steady diet.

That it is the duty of the readers of magazines to write the epitaph of the editor who is the slave of the advertiser—write to him and tell him where to jump off.

That intelligent readers, real automobilists, do not have time to peruse biased literature—the plain facts, real situations are all that will appeal to them.

That in the emancipation of the "rib" the automobile is a pronounced factor—big hats blow off.

That a "wit" is a person who has a shallow pocketbook and no prospects.

That cynicism, in its graceful and epigrammatic way, bounces the prospective out of the tonneau of the automobile that is described by the salesman as the perfection of easy-riding qualities.

That the streams are full of pike and the woods are full of pikers.

That the only way to tell a piker is to find out how willing he is to give free (?) advice.

That the more money a man has the more he is afraid of a piker and the more time he generally takes looking for one.

That it is not necessary to go far in quest of just what is wanted of the piker genera if a good fat commission is just peeping up over the surface.

That when the most reliable automobiles are sold that there is no chance of a piker getting a look-in.

That a piker will take a considerable amount of time telling a "prospective" what he thinks is the matter with certain good automobiles.

That a piker will take a "prospective" to the second-hand stall just as quickly as he will to the place where a good new automobile is to be had.

That a piker would assail the reputation of any man who might not happen to be present to refute the statement.

That a piker is not particular as to his ability to prove anything.

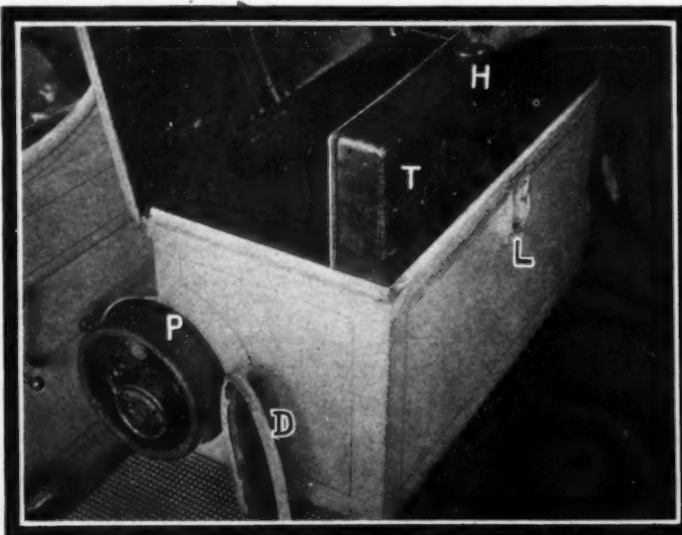
That reliable agents are to be found in stable places—their trademark is respectability.

Ingenious Placing of Gas Tank

Gas Tank Kept from the Blaze

of the Sun and Afforded Mechanical Protection

SAFETY is one of the prime considerations in dealing with a gas tank, and it is never so remote from a possible explosion as when it is mechanically protected and shaded from the heat of the sun. It should be appreciated by every owner of an automobile that when heat is applied to the surface of the gas tank, the gas within swells up and the pressure may reach high enough to cross the stability zone of acetylene. On the Peerless car, as shown in the illustration here, the gas tank is fitted into a circular receptacle formed in the tool-box in such a way that the ends of the tank are accessible, so that the pressure within the tank may be noted at will, and the connections thereto may be gotten at when it is desired to connect up with the lamps. A cover is provided, and when the tank is in its place and the doors are closed, the system is afforded the protection it deserves, and the heat of the sun is deflected away from the tank.



Combined tool box and Prest-o-Lite tank holder. The tank can be concealed by the door D and the chance of theft minimized.

When Judgment Whispers Don't When the Senses Are Dulled Even an Alarm Clock Fails of Its Purpose. Don't Select Such a Time for the Conduct of Important Negotiations

Don't allow the second-hand man to set his words to music and sing the lullaby that will make you sleep while he annexes your hard-earned coin.

Don't sheath a dagger in the breast of the sound ideas that you have on the subject of the purchase of a good automobile, as you will if you listen to the wiles of the man who urges you to take a fancy to his creation—if you know your need, satisfy it.

Don't forget that silver was known to the ancients as *luna*, and that a man who applies himself too assiduously to the getting of it is a *luna(tic)*.

Don't forget that silence is the dreadful bell that becomes the drink of terror to the lying salesman.

Don't look for harmony excepting in the automobile; if it is confined to the voice of the relator of a melody, noise will greet the ear after the money parts company with the purchaser.

Don't bathe the drooping spirit in delight in mere contemplation at the salesman's say—get a good automobile; it spells delight.

Don't look with scorn upon the sinister effort of the salesman who would undermine your faith—it is but a frittering away of valuable time—get an automobile from a man who confines his argument to the subject.

Don't look with disdain upon a sociable automobile—like a sweet-tempered person, the car may be companionable.

Don't accept a palliated description of the automobile that you want to buy—look the proposition squarely in the face.

Don't underestimate the ability of a little noise to ripen into a big din.

Don't enlarge the opening in the nozzle of the carbureter, and when trouble comes forget that it is due to an excess of gasoline.

Don't enlarge the hole in the nozzle of the carbureter if there is an indication of a weak mixture without first ascertaining whether or not the intake manifold is tight.

Don't jump to the conclusion that the hole in the nozzle is too small even if the intake manifold is tight, since the auxiliary air valve may be out of adjustment.

Don't reach the conclusion that the hole in the nozzle of the carbureter is too small, even if the intake manifold is tight, and with the further proviso that the air valves are properly adjusted—the dry cells may be run down.

Don't forget that much of the trouble that is laid to the carbureter is due to a weak ignition system.

Don't tamper with the adjustments of the magneto until every other source of possible trouble is investigated.

Don't place too much reliance upon the spark plugs even after they are carefully examined; the crack in the porcelain may be so infinitesimal that it fails to say "how-dy-do" to the optic nerve.

Don't try the spark plugs in the open and conclude that they are in working order simply because they deliver a spark; the voltage required when the spark plugs are screwed into the cylinders is greater on account of the higher compression.

Don't be in a hurry to tamper with the adjustments of the carbureter and the magneto even if the motor does balk; the trouble may be due to lack of compression.

Don't conclude that the compression is all right simply because the motor cranks hard; the latter condition would follow were the bearings devoid of lubricating oil.

Don't forget that if the compression is good the motor will crank free, excepting as the compression is induced.

Don't tamper with adjustments anyway excepting as a last resource; if there is too much lubricating oil in the system it will foul the spark plugs.

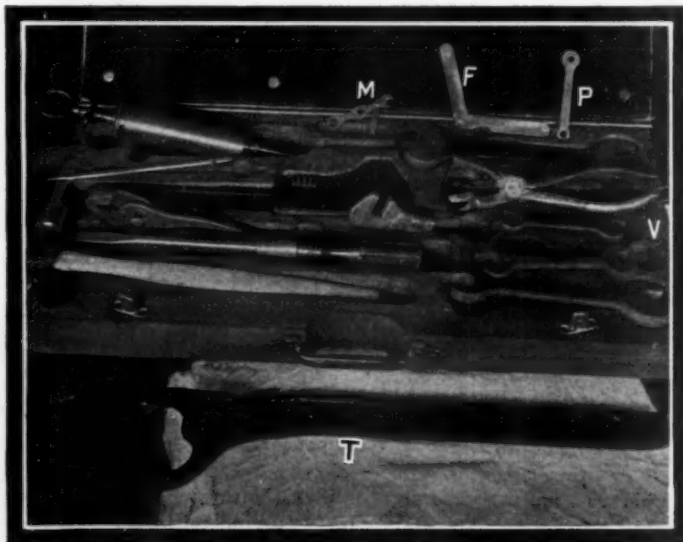
Don't dump lubricating oil into the crankcase; find out how much is needed, and measure it out first, because it is a proper economy to do so, and, second, on account of the fact that trouble will arise if there is too much or too little lubricating oil.

Don't be careless about the quality of the lubricating oil; it may be adulterated with inexpensive but troublesome ingredients.

Tool Board in the Box

Keeping the Tools from Rattling and Hiding Away Is an Important Thing to Do

AMONG the refinements in the automobiles at the present time are many points of merit that would go unnoticed by those who may not have given the matter serious consideration, but it will be understood by the average owner who drives that a few good tools kept in such a way that they are really accessible are a great advantage. The illustration as here given of a tool panel as it was taken from the tool-box on the running-board of a Peerless car tells the story so plainly that there is nothing of value to be added by a further word exploitation of the subject.



Showing how the Peerless tool kit is packed to ensure easy access and prevent rattling. Included in the kit are such tools as a magneto spanner and thickness gauge M, a feeler gauge F to determine the clearance between the valves and push rods, combined valve plug tool and tire tool

Direct Transmission

How the Fellows Direct Power Transmission Is Contrived

DOING away with the transmission gear is the aim of the Fellows Direct Transmission Company, of Los Angeles, Cal., and the method of accomplishing the task is shown in Figs. 1 and 2. Referring to Fig. 1 of the device, attention is called to the methods of its construction, and referring to Fig. 2, the chance is afforded to see how the company has put it into use. The method of functioning of the device is as follows:

The principle on which the transmission operates is illustrated in the accompanying sketch, Fig. 1, which diagrammatically shows one of the several units of the transmission. Considering the driving or crankshaft which is coupled to the motor shaft: The crank is pivoted to the connecting rod, operating at a toggle joint at the end of the link which oscillates the grip device; also pivoted to the link are a pair of supplementary links connected at their other ends with and moved by the swing frame which is pivotally supported and can be swung by the arm on lever, as shown.

The swinging of this frame varies the angularity of the toggle arms, and therefore varies the range of oscillation of the grip device.

The grip device comprises:

A grooved steel disc keyed to the driven shaft and turning with it.

A pair of rocker plates mounted, one on each side of the grooved disk and free to oscillate on the boss of the grooved disk.

At equal distances apart and near the rims of the rocker plates are journaled eight short shafts, each shaft having a squared portion which receives a dog or wedge-block, the wedge block being detachably secured by a plate. The inner end of each wedge block is wedge-shaped and formed with a convex surface the radius of which is greater than the total length of the wedge-block, so that when the blocks stand on a radial line with the driven shaft they will not engage with the walls of the V-shaped groove in the periphery of the grooved disk, but if their shafts are rocked in either direction the blocks will be tilted accordingly and will engage with the walls of the groove and turn the disk in one direction of oscillation and will slide idly and without turning effect in the other. Thus the grooved discs may be driven in either direction by tilting the wedge-blocks, or the rocker plates and wedge-blocks may be oscillated without imparting any movement whatever to the discs when the wedge-blocks are in neutral position, which is the position shown in the cut.

On the outside of the rocker-plates is a shift-ring having projections which lie directly under collets pinned on the shafts.

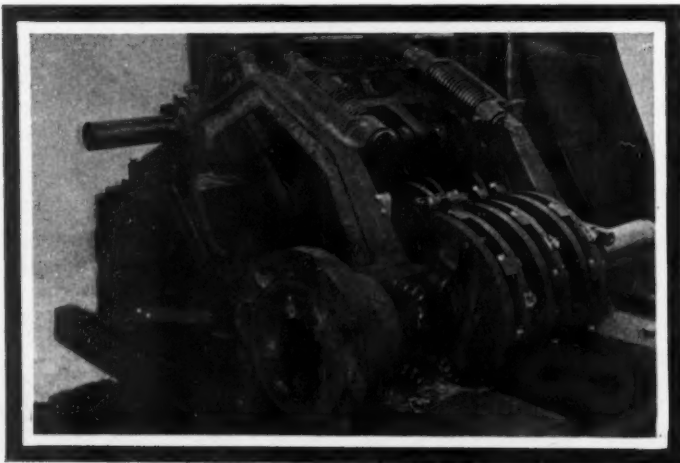


Fig. 1—Presenting the Fellows direct transmission unit as it is proposed to apply it to automobile work

A spring-pressed plunger projects from each lug and engages a concave depression on the inner face of the associated collet.

By means of a segmental gear operated by an arm carrying a pin which rides in a grooved shifter, the shift-ring may be rocked in either direction and the collets and wedge-blocks thereby tilted. This shifting may take place without interrupting the oscillation of the rocker plates, as the grooved shifters permit the continuous movement of the pins.

Operating the grooved shifter by lever control, the wedge-blocks can thus be tilted so as to rotate the disc in either direction of oscillation, or can be allowed to occupy a radial position without any effect on the disc.

By a latching mechanism the rotation of the grip device cannot be reversed except when its stroke has been reduced to the minimum.

This outline description of a single unit of the transmission is given to illustrate the principle upon which the power is carried from the driving to the working shaft.

Clogged Gasoline Pipes

Some Directions as to the Course of Procedure When

Engine Stops From This Cause

OCCASIONALLY the gasoline pipe or strainer will be clogged by fluff which comes through the pipe and lodges in or near the union connecting the pipe to the carbureter. The symptom is misfiring followed by total "dying" of the engine. If the stoppage is only partial, enough gasoline may get through to permit restarting, followed presently by the same performance. If gasoline does not flow freely when the float is depressed, first open the sediment plug. If gasoline comes out freely the trouble is higher up, possibly in the float valve orifice. If careful poking with a wire does not bring the obstruction down, take out the float valve and poke down from above. In some cases it may be necessary to disconnect and remove the carbureter to get at the obstruction. If the latter is lodged in the gasoline pipe or union, gasoline will escape, after opening the sediment plug, only till the float chamber is empty. Disconnect the union, and if still no gasoline comes, disconnect the pipe at the tank end after first closing the main valve next to the tank. If the pipe is clear the obstruction may be located in the main valve itself, or in the entrance to the pipe from the tank. Usually the latter can be reached and poked out either from inside the tank through the filler opening, or from beneath. Before embarking on the above hunt, be sure that the tank itself is not empty.

The Trend of Events—

- Points** to the fact that racing is to be conducted on a better basis than formerly, with plenty of room for improvement.
- Points** to the ending of a very successful show-year. Business seems to have been good during the winter. Some of the automobilists who have delayed purchasing the cars of their choice may have to do a little waiting.
- Points** to a big increase in the freight automobile growth—merchants are awakening to the fact that the best way to deliver goods is to use mechanical means.
- Points** to the time when there will be no horses allowed in city's streets—the time is not so far away.
- Points** to accessories of convenience, as gas-lighting fixtures that will make gas lamps far more satisfactory than they are now.
- Points** to more tire for less money than can be had now.
- Points** to larger diameter wheels (taking it on the average) than the present situation shows.
- Points** to the ultimate simplification of the automobile; the brains of the industry will have to do all of the work; the opening is sufficient for the most capable of men.

Town Cars Made with Short Wheelbase

To Facilitate Maneuvering in Congested Streets the Wheelbase Length Is Regulated

GENERAL utility automobiles do not seem to satisfy the experienced automobilist due to the fact that a long wheelbase is essential to the proper performance over country roads and at high speed, whereas in city work the long wheelbase car becomes cumbersome, and maneuvering is extremely difficult, resulting besides in a considerable extra cost of maintenance. The best results are obtained under conditions involving the use of three types of automobiles:

(a) A town car with a short wheelbase for use under conditions involving narrow streets and congested conditions.

(b) A long wheelbase touring car with ample power, a sufficiency of weight, and a speed-changing gear that will adjust itself to both good and bad roads, and also to hill-climbing conditions.

(c) A light runabout or roadster type of automobile for running errands and doing other incidental service.

In town car work the best results will obtain if the automobile is so designed that it may be turned completely around in an ordinary street, clearing the curb by a fair margin. It has been considered that a 100-inch wheelbase car will accomplish the desired end, and as the following table shows a car with a wheelbase of 100 inches will turn around in a circle of 17 feet and 3 inches

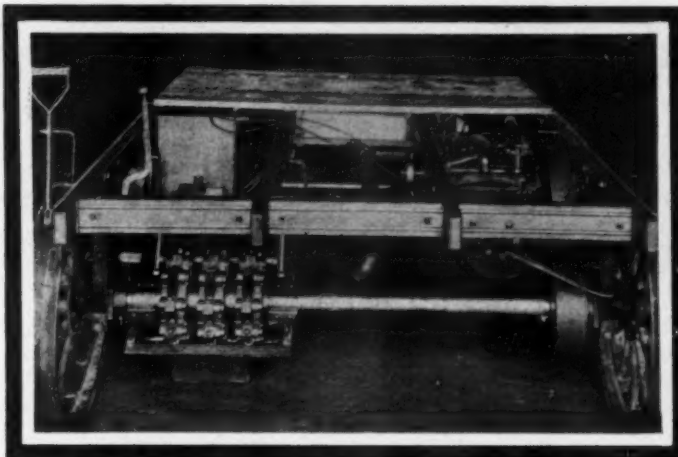


Fig. 2—Showing how the Fellows transmission unit has been applied to the rear axle of an automobile

when the steering wheel is cramped 38 degrees from the center. It might be possible to extend the wheelbase of town cars up to 110 inches, but the radius of turning would then be 18 feet 6 inches with a 38-degree canting angle. Some taxicabs are made with a 42-degree canting angle so that they can be turned around in a 16-foot radius circle if the wheelbase is limited to 100 inches. A study of the table will show the possibilities under varying conditions of wheelbase and canting angle.

Angle of Inner Wheel.	WHEELBASE													
	90"	92"	94"	96"	98"	100"	102"	104"	106"	108"	110"	112"	114"	116"
35°	16' 10"	17' 2"	17' 6"	17' 9"	18'	18' 3"	18' 6"	18' 10"	19' 1"	19' 4"	19' 8"	20'	20' 3"	20' 6"
36°	16' 6"	16' 10"	17' 2"	17' 5"	17' 8"	17' 11"	18'	18' 5"	18' 8"	19'	19' 3"	19' 6"	19' 10"	20' 1"
37°	16' 3"	16' 6"	16' 9"	17' 1"	17' 4"	17' 7"	17' 9"	18'	18' 4"	18' 7"	18' 10"	19' 2"	19' 5"	19' 8"
38°	15' 11"	16' 3"	16' 6"	16' 9"	17'	17' 3"	17' 5"	17' 8"	18'	18' 3"	18' 6"	18' 9"	19'	19' 4"
39°	15' 7"	15' 10"	16' 2"	16' 5"	16' 8"	16' 11"	17' 1"	17' 4"	17' 7"	17' 10"	18' 1"	18' 5"	18' 8"	18' 11"
40°	15' 3"	15' 7"	15' 10"	16' 1"	16' 4"	16' 7"	16' 9"	17'	17' 3"	17' 6"	17' 9"	18'	18' 4"	18' 7"
41°	15'	15' 3"	15' 7"	15' 10"	16' 1"	16' 4"	16' 6"	16' 9"	17'	17' 2"	17' 5"	17' 8"	18'	18' 3"
42°	14' 9"	15'	15' 3"	15' 7"	15' 10"	16'	16' 2"	16' 5"	16' 8"	16' 11"	17' 2"	17' 5"	17' 8"	17' 11"
43°	14' 6"	14' 9"	15'	15' 3"	15' 6"	15' 9"	15' 11"	16' 2"	16' 5"	16' 8"	16' 10"	17' 1"	17' 4"	17' 7"
44°	13' 11"	14' 6"	14' 8"	15'	15' 3"	15' 6"	15' 8"	15' 11"	16' 2"	16' 4"	16' 7"	16' 10"	17' 1"	17' 4"
45°	13' 1"	14' 4"	14' 6"	14' 9"	15'	15' 3"	15' 5"	15' 7"	15' 10"	16' 1"	16' 4"	16' 7"	16' 9"	17'

Coming Events

Catalogue of Future Happenings in the Automobile World That Will Help the Reader Keep His Dates Straight—Shows, Annual Meetings and Other Events

Shows and Exhibitions

Mar. 18-25.....Pittsburg Annual Show, Pittsburg Auto Show Association (Inc.), Exposition Hall.
 Mar. 18-25.....Montreal, Can., Automobile and Motor Boat Show, Drill Hall, Automobile and Aero Club of Canada.
 Mar. 25-Apr. 1...Buffalo, N. Y., Fourth Power Boat and Sportsmen's Show, Sixty-fifth Regiment Arsenal, Buffalo Launch Club.
 Mar. 25-Apr. 8...Pittsburg, Fifth Annual Show, Duquesne Garden. First Week, Pleasure Cars; Second Week, Commercial Trucks. Automobile Dealers' Association of Pittsburg, Inc.

Race Meets, Runs, Hill-Climbs, Etc.

Mar. 27-30.....Jacksonville, Fla., Beach Races, Jacksonville Motor Club.
 April 8-9.....Los Angeles, Cal., Twenty-four Hour Track Race, Los Angeles Motordrome.
 April 29.....Guttenberg, N. J., Track Races.
 Date indefinite...Oakland, Cal., Track Races, Oakland Motordrome.
 Date indefinite...Shreveport, La., Track Races.
 April 29.....Philadelphia-Atlantic City Roadability Run, Quaker City Motor Club.

THE AUTOMOBILE

Vol. XXIV

Thursday, March 23, 1911

No. 12

THE CLASS JOURNAL COMPANY

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FOREIGN SUBSCRIPTION AGENTS

ENGLAND:—W. H. Smith & Sons, Ltd., 186 Strand, London, W. C., and all book-
 stalls and agencies in Great Britain; also in Paris at 248 Rue de Rivoli.
 FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue
 de la Grande Armée, Paris.
 GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.

The Automobile is a consolidation of The Automobile (monthly) and the Motor
 Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903,
 and the Automobile Magazine (monthly), July, 1907.

PREPARATION is being made for the proper conduct of contests this year, the idea being to eliminate the evils of the past. It has been concluded that President Lincoln was right—"the public cannot be fooled all of the time"; it is not wise to fool the public at all. Stock car events are to be conducted under well-regulated conditions, and the purchasing public is to be placed in a position to observe the performance of regularly made automobiles and how they compare with each other. If this plan can be advanced to the third reading and passed, it will be a great stride in the right direction; but the men who are assigned the task of supervising the work must not be trammelled by previous questionable dealing. It is of no use trying to pull wool over the eyes of the public by placing new rules in the hands of men who would not know a square deal if it fell upon and crushed them. The reliable makers of automobiles are taking one of two courses, i.e., they are either supporting the proposed new plan or they are departing from racing as an advertising proposition. Both plans are honorable, and these companies show by their acts that they do not propose to have anything to do with the class of so-called sport that is based upon the idea of "putting something over" on the industry's supporters.

* * *

THIS is the time of the year when the average automobilist is put to the necessity of preparing for a summer campaign. The pleasure of automobiling for a season, which also means profit, depends upon the con-

dition of the automobile, and in order to be sure that the car will do good work for a season it is necessary to go over the same and note its condition, fixing the parts that are in need of attention. Even if the general indications are that the car will run for another year without having to be repaired, it will be a good idea to take it apart and clean it, making all necessary adjustments when it is being put together again, thus making doubly sure, and—who knows?—performing some service that will render the car fit, saving the owner from a hidden danger. It must be remembered that the better the motor performs the greater is the necessity of having the control systems in the best possible shape, and as the motor shows ability the brakes should support the issue, observing that if the automobile is made to go fast it should also be capable of stopping quickly.

* * *

TOURING will soon be the pastime of the average automobilist, and beyond the demand for good roads there is the necessity for accurate information. Maps, while they look feasible, fail utterly to satisfy the needs of touring from a certain point of view, unless they are keyed into a suitable road description. In the meantime every automobilist knows the conditions of the roads in his locality best, and it would be of great advantage to brother automobilists were this detailed information to be sent to the Editor, to be published in THE AUTOMOBILE. Photographs would help out, and the campaign for good roads would be given a boost were these matters taken up in earnest.

* * *

DOCTORS have to make calls without consulting the weather or the time of the day or the night, and, considering the character of the service that they are required to render it remains to be stated that their needs in the way of transportation are prescribed within narrow limits. As a business proposition, the average doctor can ill afford to engage the services of a driver. As a precaution against infecting the wound of a patient the doctor is debarred from putting on tires when he is en route to perform a surgical operation. It is also true that cold weather must be fortified against if the doctor is to be at his best when he gets out of the car, enters the presence of the patient, and immediately proceeds to do his work. An inside-drive, enclosed automobile, of light but substantial construction, offers attractions that the average doctor cannot afford to overlook.

* * *

TIRE MAINTENANCE is the theme that seems to be never-ending, due to the fact that the cost of tires, like the cost of oats, represents an item that must be noticed in the cost of transportation. In the meantime, from the horse point of view, the oats are kept in a tight bin, and they are measured out to the horse with some care. When it comes to the tires, they are put on the wheels with some care and they roll along the road, taking the brunt of the work. The great question, from the maintenance point of view, is to give the tires the best possible attention, inflating them fully, which is not always done, and keeping them as free as possible from the little wounds that allow water, with mildew, to enter and destroy the fabric.

News Section

Happenings of the Week in Various Parts of the Country as Gathered by the 85 Special Writers and Correspondents of THE AUTOMOBILE

United States Motor Company Withdraws Abruptly From Participation in Racing—Howard C. Marmon, Howard E. Coffin and Other Manufacturers Give Their Views on Racing, Taking Favorable Angle—Full Text of the Reliability Rules Under Which the Contest Board Will Conduct Competitions to Test the Stability, Utility and Endurance of Automobiles—News of Shows and General Matters of Interest to all Sections of Motordom

United States Motor Co. Withdraws from Racing

(Special to The Automobile.)

NEW YORK, March 22—Absolute withdrawal of the United States Motor Company from all automobile races and contests in which speed is a primary factor was announced yesterday by President Benjamin Briscoe in a statement that was no less emphatic than surprising.

Mr. Briscoe declared that the action of the company was unqualified and unalterable. Neither the \$30,000,000 company nor any of its eleven affiliated companies will hereafter participate in speed events. Reliability contests only will be entered.

The announcement must be taken as a distinct blow to racing in this country, but the decision was made after every measure of value was properly weighed. Despite the most liberal consideration of the subject, the arguments favoring withdrawal were overwhelming. Thus the Maxwell, Columbia and Stoddard-Dayton cars, which have done excellent work in past racing, will not be entered in future nor will any of the divisions be represented unless by private owners, and this is extremely unlikely.

"Races are meaningless," said Mr. Briscoe. "They teach nothing to the man who buys a motor car as a vehicle of utility or of pleasure. The mere ability of an automobile to run at sustained high speed over a given course shows speed only. I am confident that the prospective buyer is more interested in reliability and economical maintenance.

"Our purchasers are not racing drivers. We know, from personal contact with them, that they have great respect for the showing made in a long-distance reliability contest that is well managed. Reliability events are the only contests in which it is possible to prove the mechanical stamina of a car under conditions approximating the average owner's experience."

Nineteen Entries for Beach Races

JACKSONVILLE, FLA., March 22—With the closing of the official entries March 16 for the Atlantic-Pablo Beach races March 27-30, 25 cars have qualified and preliminary trials are now being held over the water-washed course, under the direction of the Jacksonville Motor Club.

The list of entries is as follows: 2 Nationals, 2 Coles, 2 Buicks, 2 Warren-Detroits, 1 Mercedes, 1 Knox, 1 Case, 2 Benz, 1 Darracq, 1 Lancia, 1 Herreshoff, 2 Pope-Hartfords, 1 E-M-F.

Nearly all of the cars that competed at New Orleans have entered with the same drivers. Camps are being established on the beach by all the contestants, and an enormous grandstand is nearly completed. Electric timing instruments are being installed, and Chairman Butler, of the Contest Board, will pass upon the arrangements. Twenty-eight races will be held during the four days' meet. There is a friendly rivalry between

the horse racing and the automobile contingent, nearly all of the visitors in the city who are here for the horse races are going to stay over for the automobile races, and a record-breaking attendance is expected.

In an exciting novelty race held at the Moncrief Park track March 21, a Buick (Burman) established a new world's record for the mile and one-sixteenth from a standing start in 1:06.

The following is a list of drivers who have qualified: Disbrow, Aitken, Willcox, Merz, Edmunds, Evans, Tower, Ferguson, Hughes, Strang and Burman.

There are six stock car events carded among the twenty-eight races on the program. The rest are divided between Class C cars, which may be of special construction, and Class D, which includes anything that answers the description of a motor car.

New 100-Mile Mark for Lozier

LOS ANGELES, March 20—Leading from gun to flag, a Lozier driven by Tetzlaff won the 100-mile match race staged on the mile motordrome here on Saturday, defeating a Fiat, driven by De Palma, by a margin of 6 1-2 miles.

The Lozier car established a new mark for the distance, lowering the record made by a Marmon (Harroun) by nearly two minutes. The record of the race is not a world's mark, although it was the fastest century run ever made in competition. The car was the same which won the Santa Monica road race last fall.

Wilkes-Barre Sees Its First Show

WILKES-BARRE, PA., March 20—The first automobile show ever given in this city opened to-night under auspicious circumstances. The show is being held in the Ninth Regiment Armory, and is endorsed by the Wilkes-Barre Automobile Club.

Green and white are the show colors, and the scheme of decoration is carried out along elaborate lines.

Judging by the attendance to-night the crowds are going to be satisfactory to the club and the exhibitors.

Ideal Plant Visited by Fire

LANSING, MICH., March 20—Fire this afternoon destroyed the factory of the Ideal Motor Company. It is supposed to have started from sparks thrown off from an emery wheel used to grind motor parts. The flames spread rapidly, fanned by a sharp wind, and the main building was reduced to ruins in less than an hour. The company manufactures gasoline motors of small size for farm use and has an extensive trade.

Plans for rebuilding and repair are already under way.

What the Makers Say

Telegrams, Special to THE AUTOMOBILE, From the Makers of Automobiles, Throw Light Upon the Racing Subject, Indicating the Trend

WHILE not a single signature has been secured to bind a manufacturer to participate in the Grand Circuit Automobile Racing Train plan, the idea has met with much unofficial favor among leading concerns. In order to determine the attitude of a number of prominent makers, THE AUTOMOBILE made a wire canvass of the situation this week, the results of which are appended hereto.

The crisis of the matter will likely be reached in the near future when formal contracts providing for participation or a forfeit are presented to the manufacturers for signature.

The plan under consideration is to sign up enough makers to insure success and then lay out a schedule of events and dates.

Three dates have been practically settled. The first is for the Indianapolis Speedway meet on May 30; second, the Elgin National Championship events, August 25-26, and the Labor Day meeting on the Indianapolis Speedway.

In case sufficient of the manufacturers sign up, the schedule will probably be announced in about two weeks.

Howard Marmon, Vice-President of M. C. A., Gives Status of Racing Contests

INDIANAPOLIS, March 22—Information gleaned by a personal canvass of a large majority of factories reveals such interest in the Capitol to Capitol tour and in the Grand Circuit project with its special train that great success is assured for both. Preparations for these two events have been completed and approved and they will be officially launched in a few days.

The Grand Circuit plan seems to appeal very strongly to both manufacturers and promoters, on account of the very considerable reduction in expenses to both sides, the insurance of more high-class contests with fuller entry lists, conducted by trained and high-class officials, with more thorough technical supervision, carefully selected dates and the complication and worry of transportation and accommodations eliminated.

It is interesting to note changes in the industry as shown by the fact that manufacturers are ready with complete preparations to start on a tour of racing early in the season, instead of barely finishing cars on the eve of a particular race.

The new features to be introduced in the National Tour, the type of route selected, university students for observers and the introduction of a hill climb day have met with a hearty approval of manufacturers.

H. C. MARMON.

Knox Will Depend Upon Private Owners

SPRINGFIELD, MASS., March 21—The Knox Automobile Company is not going into racing this year, but the company is building some fast stock raceabouts for private individuals who expect to enter them in various events around the country, including Indianapolis and the big event of the French racing year.

While the Knox company officially has been out of racing for the past two years, many events have been won by Knox cars during that period through the medium of private owners.

The Grand Circuit idea is without doubt a fine publicity undertaking and the stiff racing will show up defects in design

and material in a way that no other method could bring out. Racing has always greatly benefited the industry.

KNOX AUTOMOBILE COMPANY.

Jackson Will Go in for Big Events

JACKSON, MICH., March 21—We will enter three cars in the 500-mile race at Indianapolis. One of these will be driven by Fred Ellis, and another by Harry Cobe. There will be two stock model 59's and one special Jackson "Cyclone."

The new circuit will undoubtedly be of great value to the industry, partly from the saving in transportation expense and very largely from the sustained public interest.

JACKSON AUTOMOBILE COMPANY.

Coffin Reports Progress in Contest Matters

DETROIT, MICH., March 21—Fine progress is being made in contest matters, and the makers of commercial cars are joining hands with pleasure car makers for the proper control of all contests through the Manufacturers' Contest Association and the Contest Board.

Commercial contest rules are now in course of preparation, and it is a certainty that the commercial vehicle builders will never experience the chaotic conditions in contest affairs which two years ago confronted the manufacturers of pleasure cars.

The arrangement in circuit form of all the major 1911 pleasure car contests insures a logical sequence as to time and place, which will reduce the expense to participants to the minimum.

The services of experienced officials and all members of the Technical Committee of the Contest Board are also assured at all important events of the season.

HOWARD E. COFFIN.

Lozier Will Try With Stock Cars

DETROIT, MICH., March 21—We have no definite campaign outlined for this season. Racing has been of great value to us in testing new models and discovering quickly through severe contests unsuspected weaknesses, enabling us to correct faults.

This is the reason we always race with stock cars, and if we enter a contest this year it will be with stock models. We favor the Grand Circuit plan.

We believe the public does not realize the great value of racing to the factory. A big season of racing this year cannot fail to improve the character and quality of the cars of contesting builders.

C. A. EMISE.

F. A. L. Will Proceed on Last Year's Lines

CHICAGO, March 22—The F. A. L. Motor Company will enter the racing field in 1911 on about the same plane as last year. Stock cars exclusively will be used in all the racing events. Contest plans for this year have not been completed as yet. The industry seems to be in thoroughly profitable condition.

F. A. L. MOTOR COMPANY.

Chalmers Plans Not Yet Perfected

DETROIT, MICH., March 22—The racing plans of the Chalmers Motor Company have not been made definitely so far.

CHALMERS MOTOR COMPANY.

Work Starts on Elgin Course

CHICAGO, March 20.—The Elgin Automobile Road Racing Association held its annual meeting Thursday, elected officers for the ensuing year and paved the way for the renewal of the National Stock Chassis Road Racing Meet on August 25-26.

Walter Hemmens, postmaster of Elgin, was elected president, succeeding F. W. Jencks, who became one of the directors; otherwise there were no changes in last year's officials.

The association already has started its work, and at present is scraping and dragging the course in anticipation of heavier work later on. The home stretch will be widened at the grandstand by cutting down the knoll at Britten's and using the gravel secured in this way for widening purposes. It also has been decided to start the races at 11 o'clock each day instead of 10, in order to give the spectators a better chance to get to the course. Permits to use the roads for racing purposes have been secured from the road supervisors of Kane County and from all indications everything will be harmony at Elgin this Summer.

Plans also are under way to oil the 23 miles of road from the city limits of Chicago to Elgin in order that spectators driving to the races may travel over a model highway. Entry blanks and other details concerning the big events will be issued by the Chicago Motor Club within a week or so.

Outlawed Cars Are Reinstated

By formal action of the Contest Board the ban of suspension laid upon the cars "owned or controlled" by a certain outlawed driver, consisting of three foreign cars and a 6-cylinder Knox, has been raised and the penalty upon them reduced to a fine of \$1,000.

It is reported that the cars have been purchased by E. A. Moross, a race meet promoter who once acted as manager for the outlawed driver. It is also understood that the money required in the transaction was furnished by "Indianapolis parties."

The fine has been paid, according to official announcement, and the four cars are restored to good standing.

Capital Plans 700-Mile Run

WASHINGTON, D. C., March 20.—The "Four Leaf Clover" run to be given under the auspices of the Washington Automobile Club for four days, commencing May 15, has been definitely arranged. The run will be over courses aggregating 700 miles and will be divided into four-day tours, the night control in each case being in Washington.

The first day's run will be to Chambersburg and return, 190 miles. The second day's route will be to New York and return, 180 miles. Third day to Martinsburg and return, 160 miles.

Each place mentioned as the outward terminus of the day's run is to be noon control for that day.

Vermont to See Initial Show

BURLINGTON, VT., March 20.—The automobile in show dress will make its debut in Vermont during the first week in May, when the First Annual Automobile Show will be held in the Armory in this city.

Invitations have been extended to every automobile dealer in the State to take space, and it is expected that the response will be liberal. The Armory is favorably situated and is admirably suited to show purposes, the drill floor being on the street level, thus requiring no skidway to install the exhibits.

A number of accessory manufacturers have signified their desire to participate in the show and preparations are being made to house a goodly number of parts and accessory exhibits at the exposition.

During the week selected the Burlington Merchants' Protec-

tive Association will hold its "Merchants' Week" and as in the past the city will undoubtedly be visited by a throng of tradesmen from all over the State.

Vermont as a State ranks eighth in the list as far as the use of the automobile is concerned. This rating is determined by the ratio of automobiles owned in the State to the total population.

According to a tabulation, the figures of which were taken from the Madison Square Garden issue of THE AUTOMOBILE and which are prominently credited to this publication, which is being used by the publicity department of the show, the number of cars owned in Vermont is 3,223 and the population of the State is 355,956. This gives one automobile for each 110 persons in the State.

Thus the popularity of the automobile is shown to be particularly high in Vermont.

The show is being promoted by George D. Jarvis and C. Arthur Hawes.

News of the Detroit Trade

DETROIT, MICH., March 20.—Several Detroit plants are materially adding to their working forces. The Packard Motor Car Co. is advertising for lathe hands, tool makers and shaper hands. The Ford wants at once crankshaft grinders, lathe hands, carpenters, solderers, bench hands and patternmakers. Bodymakers are in demand at the C. R. Willson Body Co.'s plant, and the Oakland Motor Car Co., of Pontiac, needs color and brush hands. All of which indicates renewed activity in practically every branch of the industry. The sales forces are busy generally and the daily shipments of cars are steadily increasing.

Closely following its announcement of the fore-door Flanders "20" at \$800, the E-M-F Co. now brings forth a full-vestibuled, five-passenger E-M-F "30" at \$1,100. The latter is as much of a surprise as the "20" and has created a small sensation in local trade circles.

W. T. Cullen, of Detroit, Western sales agent for Brunn & Co., of Buffalo, is showing here for the first time a model of the company's combination torpedo-phaeton body. It is tastefully finished and the ease with which it can be converted from one type to the other seems to be making a hit with a certain class of users. Mr. Cullen has received orders for a number of cars.

W. C. Anderson, president of the Anderson Electric Car Co., of this city, has gone to New York to attend a meeting of the stockholders for the purpose of incorporating a separate company under the laws of New York State. This has been found expedient on account of the rapid expansion of the business in the East. Mr. Anderson will also head the new company.

M. A. Weissenburger has gone to New York to become district manager for the Regal Motor Car Co. He will have his headquarters at Broadway and Fifty-second street, adjoining the Regal warehouse in that city.

The Chalmers Motor Co. has leased a store in the new Dodge Power building on Jefferson avenue for its factory branch. The salesroom is roomy and light and there is space for the exhibition of more than a dozen cars. Automobile service will be maintained between the factory and the branch, regular trips being made daily at 10 a. m. and 2 p. m., for the benefit of customers. A corps of guides will be maintained for the purpose of showing visitors through the plant.

Cincinnati is figuring on an auto patrol system and has sent Chief of Police W. H. Jackson to Detroit to get pointers. At present Cincinnati has only one touring car for its police department, and this is used only in emergency cases.

In last week's issue of THE AUTOMOBILE in the article dealing with the King Motor Car Company the statement was made that the bore of the cylinders of the car was 3 3/16 inches and the diameter of the valves 1 1/16 inches. These should have read 3 13/16 inches and 1 15/16 inches respectively. The motor rating is 36 horsepower.

1911 Reliability Rules

Complete Text of the Regulations Governing Contests to Determine the Stability and Endurance of Automobiles Under Service Conditions on Road Tours

FOLLOWING is the complete text of the Reliability Rules of the Contest Board, amended and amplified to meet conditions of 1911. The rules are much more explicit than in previous years, the idea in framing them being the standardization of everything connected with this branch of automobile contests.

In the rules will be found uniform blanks of various sorts, intended to do away with one of the big difficulties that have been found in nearly all reliability contests where lack of uniformity in this particular has caused trouble.

400. Grades.—Reliability contests shall be divided into four grades, First, Second, Third and Fourth, respectively, as follows:

GRADE I.—Time, Work, Tests, Technical Examination—A contest not exceeding six (6) days in duration, with penalties for time, road work, final operative test and final technical examination, as laid down in Rules No. 400 to 523, shall be known as a contest of the First Grade.

GRADE II.—Time, Work (carburetor, brake and spark plug adjustments excepted), Tests, Technical Examination—A contest of more than six (6) days' duration, with penalties for time, road work, final operative test and final technical examination, as laid down in Rules 400 to 523, with the following exceptions, shall be known as a contest of the Second Grade:

(1) Brakes may be adjusted without penalty at stated points, such adjustments to be made in night control, under official supervision, by the driver and mechanic of the car.

(2) Carburetors may be adjusted for air or gasoline without penalty at night controls during the forty-five minutes allowed for lubrication. Only such adjustments as can be made without removing or taking apart the carburetor will be permitted.

(3) Spark plugs may be changed, make and break mechanisms and magnetic spark plugs may be cleaned without penalty at night controls during the forty-five minutes allowed for lubrication. (424.)

GRADE III.—Time and Work Only—A contest of any duration in which penalties are imposed for time and road work only, but in which the final operative test and preliminary and final technical examinations provided for in Rules 435, 502, 503, 504, 505, 506 and 516 are omitted, shall be known as a contest of the Third Grade.

GRADE IV.—Time Only—A contest of any duration in which penalties are imposed for time only and in which the provisions for Tools (Rule 417), Preliminary Inspection (Rule 435), Observers (Rules 465 to 485), Replenishments of Oil, Gasoline and Water (Rule 497), Final Operative Tests (Rules 502 to 506), Penalties for Road Work (Rules 512 to 515), and Final Technical Examination (Rule 516) are omitted, shall be known as a contest of the Fourth Grade.

400A. Class "A" and Divisions.—Reliability contests shall be held under Class "A" only and run in the seven divisions thereof, as follows:

CLASSIFICATION OF CARS.—Touring Car Class—Touring cars shall be divided into seven divisions of Class A as follows:

Division 1A.....	\$ 800 and under
Division 2A.....	801 to \$1,200
Division 3A.....	1,201 to 1,600
Division 4A.....	1,601 to 2,000
Division 5A.....	2,001 to 3,000
Division 6A.....	3,001 to 4,000
Division 7A.....	4,001 and over

Runabout Class.—The runabouts, miniature tonneau, surreys, and single or double rumble-seated cars shall be divided into seven divisions of Class A as follows:

Division 1A.....	\$ 800 and under
Division 2A.....	801 to \$1,200
Division 3A.....	1,201 to 1,600
Division 4A.....	1,601 to 2,000
Division 5A.....	2,001 to 3,000
Division 6A.....	3,001 to 4,000
Division 7A.....	4,001 and over

Touring Cars and Runabouts Shall Not Compete Together in the Same Class.—In determining the price classification of a car the cost of lamps, lighting equipment, speedometers, horns, clocks, tops, wind shields, baggage racks, and tire carriers shall not be used in computing the price of the car for classification.

The cost of extra equipment which is a germane part of the car in the contest and which equipment or part is liable to penalization for work done thereon or for defective condition at the final technical examination, shall be used in computing the price of the car for classification.

SPEED OF CONTESTANTS.—400B. The following average speeds shall be maintained by the contestants in the touring car and runabout classes in the respective divisions:

Division 1A.....	16 miles per hour
Divisions 2A and 3A.....	18 miles per hour
Divisions 4A, 5A, 6A and 7A.....	20 miles per hour

400C. All cars to avoid penalty will arrive at checking stations as per their schedule, plus additions, if any, to the running time for delays on account of tire troubles. (Rule 420.)

400D. The Referee may, if the necessities of the weather or road conditions demand, vary the speed schedules for each division,

maintaining the ratio between divisions as provided in Rule 400B, announcement of any change being made by the Starter previous to the start of the day's run to which the change shall apply, or during a day's run at any checking station by the checker at the designated station where the change is made, due notice being given to all contestants, who shall acknowledge receipt of such notice by signing the checker's card.

401. Application for Sanction.—A promoter must clearly state in his application for sanction the grade of Contest which he desires to run.

OFFICIALS.—402. The officials of a Reliability Contest shall be a Referee who shall be the Pacemaker, a Pilot to distribute confetti, a Timer or Checker at each end, intermediate checkers as needed, a Chief Observer, such Observers as may be necessary, and a Technical Committee of Three.

CONTESTING CARS.—403. Stock cars only shall be eligible to compete. (See Stock Car Definition, page 5.) Contesting cars must be registered with the Contest Board previous to start of run.

404. Each competing car shall be delivered into the custody of the Promoter's Technical Committee for official examination before the start of the contest, at the date required by the Committee, which shall be specified upon the entry blank to determine if it is a stock car and regularly equipped.

405. Each car must carry at all times during the contest its catalogued equipment of lamps, tools, tire tools, body, fenders, sod pan, running boards, muffler and body parts; and, in addition, may or may not use wind shield, top, extra tires, baggage rack, lamp bumpers and supplementary tonneau seats.

406. Special mud aprons may be used in front of the radiator or bonnet screens between the side members of the frame, same to be attached before the start of the contest in a manner satisfactory to the Technical Committee, without penalization for work on them, excepting that work must be done on car's running time.

407. Rubber bumpers for springs and rebound straps may be used without penalization for trouble with them. Repairs, or replacements, to be made on running time.

408. Tire inflating tanks of any nature may be used.

409. Cars are not permitted to use search lights unless same are part of regular equipment, but may affix two ordinary gas or electric lights with generator or gas tank.

410. Covers over coil boxes on the dash, or wherever located, not permitted unless regularly provided.

411. Leather or other covers over magnetos not permitted unless supplied regularly with stock cars.

This applies to any other part of mechanism as well.

412. Screenings or shields of any construction around carburetor not permitted unless regularly fitted to stock cars.

413. The cotter pinning, or lock nutting of nuts or riveting of bolts or studs, other than is regularly done on stock cars at the factory, not permitted.

414. Spring windings and shock absorbers may be used without penalization for trouble with them, excepting that any repairs or replacements must be made on the running time and by the car crew.

415. Taping of the ignition terminals at any point, or the use of tape or similar material on any of the oil pipes, gasoline pipes, water manifolds, intake manifold, etc., not permitted unless stock, as per stock car requirements, page 7. Leather or other covering over steering connections not permitted unless regular on stock cars.

PASSENGER LOAD.—416. A touring car shall carry four or more persons.

A miniature tonneau, surrey, a runabout shall carry two or more persons.

Passenger load in all body types must average 125 pounds per person or a like amount in ballast.

TOOL REGULATIONS.—417. All tools for the car will be carried in a special tool bag furnished by the Promoter, which shall be sealed and handed over to the Observer, and the use of tools other than those carried in the bag is prohibited. The number of tools is not limited to the supply sold with the car.

When tools are needed the driver or mechanic will obtain them from the Observer, who will keep a strict account of the number of tools used and see that they are returned to him at completion of work.

Tire tools may be carried in the regular tool compartment of the car but must not be placed in the official tool bag.

TIRE REGULATIONS.—419. Each entrant may carry as many tires, demountable rims and tire chains and the parts which secure them in place as desired or purchase or obtain them en route without penalty, but cannot obtain them from another contesting car, and a contesting car cannot leave the course to purchase or obtain them.

420. There shall be no penalty for tire repairs, provided the engine be kept running while the repairs are being made and no other work is done. The time consumed in making the repairs, while the engine is running, shall be added to the day's running time.

420A. The rule applying to tire repairs (420) shall also apply to the fitting, repairing or removing or replacing of anti-skid devices.

420B. In case motor is stopped during tire repairs, a penalty of one point per minute will be imposed.

TIRE CONTEST.—421. The use of these tire penalizations is optional with the promoter.

Tire penalties count against the make of tire only and are not

counted in the car penalization and do not in any wise affect the car's score. All work done on tires will be penalized at the rate of one point per man per minute of each and every stop. The winner will be determined by computing the average penalization per tire of each make, the tire with the least average penalty being the winner. At least eight tires of one make must compete in order to be eligible for a tire trophy. At least 50 per cent. of the competing tires must be carried on rear wheels. In case any make of tire is represented by fewer than eight tires, these, while not being eligible for a tire trophy, will have their penalizations recorded. In cases where tires are covered by protectors of a different make than that of the tire, such tire will not be considered as contesting for a tire trophy, but will have its penalizations recorded. Contesting tires may be of any standard style with studded or plain treads and must not be of larger size than regularly fitted.

Desired alterations in tire penalization schemes may be made, subject to approval of the Contest Board.

LUBRICATION REGULATIONS.—422. At the option of the Promoter a record will be kept of oil consumed by each contesting car during the contest, but this consumption will not be a factor in determining a car's road score. The Promoter's Technical Committee shall have charge of the execution of this rule.

423. No additional lubrication equipment, such as pumps for forcing oil direct into crankcase, will be allowed, unless cars are regularly sold with such equipment.

(496). At noon or night controls, tanks for lubricating oil may be filled without penalty.

(497). For replenishments of oil, at any other places, the penalty is 3 points for each occurrence.

(498). Oil or grease may be added to or may be drawn off the various cases when necessary without penalty during the 45 minutes allowed for oiling at the end of each day's run.

424. At the completion of each day's run (except the final day) after the cars are garaged, 45 minutes will be given each contestant for lubricating all parts of the car, such as crankcases, filling and turning of grease cups, motor, gear box, and other parts. This will be done under the supervision of the Observer and a member of the Promoter's Technical or Contest Committee. Only one member of the car crew shall work at the lubrication.

424A. Extra supplies of oil may be used without penalization only after a car has covered 100 miles on a control. Such supplies may be carried on the car.

GASOLINE REGULATIONS.—425. At noon or night control tanks for gasoline may be filled without penalty. (496.)

For replenishment of gasoline at any other places the penalty is 3 points for each occurrence. (497.)

Extra supplies of gasoline may be used without penalization only after a car has covered 100 miles on a control. Such supplies may be carried on the car.

Carburetors cannot be adjusted any time during the run or worked upon without the regular penalties.

Squirting of kerosene into the carburetor during the 45 minutes allowed for lubrication not permitted.

WATER REGULATIONS.—426. At noon or night control radiators may be filled without penalty. (496.)

For replenishment of water at any other places the penalty is 3 points for each occurrence. (497.)

Extra supplies of water may be taken on without penalization only after a car has covered 100 miles on a control.

Mud or other matter cannot be washed off radiator during the run, except same being counted as work done and penalized accordingly.

BATTERIES.—Replacing of storage or dry batteries will be allowed at any time without penalty, outside of controls and on car's running time. (499.)

ENTRIES.—427. Entries shall be numbered in the order of their receipt.

427A. Each entrant shall, at least three days before the start, name an official representative for each of his entries, failing which the driver of the car shall be considered the official representative.

427B. The official representative of the entrant shall be subject to all rules and penalties prescribed for the entrant, and shall be considered as the entrant in fact.

428. Upon making an entry, each entrant shall appoint one observer for each car entered. (See Rule No. 465.)

429. No more than three cars of any one make may be entered in either of the body equipment classes provided in the "Stock Car" definition.

430. The entry fee will not be refunded in case a car fails to start or is disqualified during the contest, or in any case, unless the contest is for any reason abandoned.

431. Entry blanks shall state the date on which entrant's cars must be delivered to Promoter's Technical Committee for examination before the start. (Rule 404.)

432. Entries shall close at least five days before the date fixed for the contest.

433. Any attempt at fraud in the evasion of the "stock car" definition or status of the car on the part of an entrant shall disqualify the car, the driver and the entrant.

THE ROUTE.—434. The route shall be exactly marked by one or more of the following methods:

(a) By throwing confetti on the right side of the road 100 yards before and 100 yards after any turn. On long stretches, without turns, occasional throwings, especially at points 100 yards after passing any corner where a turn has not been made.

(b) By providing each contestant with a description of the route, giving explicit directions of all right and left turns and right and left forks, and with occasional references to some conspicuous object. Mileage distance shall be placed to the left of each of these points noted in the route descriptions.

(c) By marking the course with arrows and discs, the arrows to be placed 100 yards before a turn and the discs 100 yards after a turn. Discs shall also be placed 100 yards after passing any corner where a turn has not been made.

PRELIMINARY INSPECTION.—435. Contesting cars shall be given a preliminary inspection preceding the start of the contest. At this inspection one representative of the entrant will be present with the Technical Committee of the Promoter.

An inspection card showing the condition of wheels, springs, frame, front and rear axles, steering pivots, steering gear, body, motor, ignition parts, lubricating parts, cooling parts, carburation parts, exhaust parts, clutch parts, transmission and control parts, brakes and brake-operating parts, etc., will be filled out and any noticeable points about each that might later occasion dispute, recorded. This card must be attested by the entrant's representative.

During the preliminary examination there shall be a period of one hour, set by the Promoter, before the start, during which all cars shall be on view with bonnets off and floor boards raised, for inspection by competitors. Contestants must be notified of this hour in advance.

OFFICIAL FORM OF TECHNICAL CARD FOR BOTH PRELIMINARY AND FINAL EXAMINATION

Reliability Tour
FOR

(Date).....Trophy

TECHNICAL CARD

Car.....
Preliminary Examination

Wheels	Cooling System.....
Springs	Carburation
Frame	Exhaust
Front Axle.....	Clutch
Rear Axle.....	Transmission
Steering Pivots.....	Control
Steering Gear.....	Brakes
Body	Gasoline at Start.....Gals.
Motor	Oil at Start.....Pints.
Ignition	Gasoline at Finish.....Gals.
Lubricating Parts.....	Oil at Finish.....Pints.

Preliminary Final

Distance between Front Wheel Follies.....	in.....in.
Distance between Rear Wheel Follies.....	in.....in.
Right Front Spring.....	in.....in.
Left Front Spring.....	in.....in.
Right Rear Spring.....	in.....in.
Left Rear Spring.....	in.....in.

Remarks:

.....
.....
.....

We hereby agree that foregoing is a correct report of condition of above named car.

(Date).....

Car Representative.

Technical Examiner.

FINAL TECHNICAL EXAMINATION

No..... Car.....
Penalty Points

Lubrication	Machinery.....
.....	Axles—Follies.....
.....	Front—(see reverse side hereof).....
.....	Rear—(see reverse side hereof).....
.....	Springs.....
.....	Right Front—(see reverse side hereof).....
.....	Left Front—(see reverse side hereof).....
.....	Right Rear—(see reverse side hereof).....
.....	Left Rear—(see reverse side hereof).....
.....	Final Operat. Tests.....
.....	Brake Test.....ft.
.....	Service Brake.....ft.
.....	Emergency Brake.....ft.
.....	Clutch.....
.....	Gear Set.....
.....	Transmission.....
.....	Motor.....
.....	Open Throttle.....
.....	Closed Throttle.....
.....	Late Spark.....
.....	Early Spark.....
.....	Remarks.....
.....
.....

We hereby certify the foregoing is a true report of the conditions of and penalties attaching to the above named car upon final technical examination at completion of tour, in addition to any other penalties which may otherwise have been imposed during course of tour.

July....., 1911

Chairman

Technical Committee

DRIVERS.—441. Drivers may be changed as often as desired, but report of same is required to be made to the referee and the regular and substitute drivers shall be named in the entry blank.

In case of illness, emergency drivers may be used.

Drivers shall report at the official garage or park one-half hour before the announced starting time for the day and they, together with the observers, will be placed in charge of cars, whereupon they will immediately proceed to the starting line and take their proper places ready for the start.

Drivers must not rely upon information obtained from the observers as to the route to be followed or as to any question regarding penalties or rules.

OFFICIAL HEADQUARTERS.—442. There shall be an official

headquarters where all announcements must be posted on a bulletin board before and after a contest.

443. Before the start of any contest, all drivers, observers and entrants shall attend a meeting held for the purpose of instruction as to the intent of these rules. This meeting shall be in charge of the referee.

444. When the contest exceeds one day in duration an official bulletin board shall be displayed at official headquarters each night, giving such additional information as may be required. Failure on the part of drivers, observers or entrants to attend the meeting of instruction and to consult the official bulletin board displayed at the headquarters shall be at their risk.

Start.—445. The time of starting shall be announced by posting on the bulletin board, or otherwise, the evening previous to each day's start.

Cars will be started each morning at the hour announced the evening previous, the different cars starting at one minute intervals.

Starting controls will be closed at the expiration of the number of minutes after the start of the first car, that there are cars competing.

If any car is unable to start at the closing of the starting control, it shall be considered as checked out, and its running schedule begins from that time.

446. Cars shall start in the order of their presentation at the starting line and without regard to classes or divisions.

OFFICIAL NUMBERS.—447. Each car shall have its official number prominently displayed on each side of the hood, painted on the radiator in front, and if possible, on the rear of body.

448. The name of the car in letters 4 inches high may appear upon the sides and upon the front and rear.

REFEREE-PACEMAKER.—449. Referee's Official Pacemaking Car.—The Promoter of a contest shall be required to provide an official pacemaking car for the exclusive use of the Referee, who shall be the pacemaker. The Referee shall set a pace for each day's run and shall precede the contestants not fewer than 15 minutes ahead of the first contestant, and shall maintain the running schedule of Division 7A between any two checking stations, and be accessible to contestants at the end of each day's run. Where local conditions are factors, modifications of this rule may be made by the Referee, due notice of same being given to contestants.

450. Contestants Shall Not Pass Pacemaker.—Any entrant or representative thereof who willfully passes the pacemaker shall be disqualified. If the pacemaker's car breaks down or is compelled to travel at a rate of speed so slow as to impede the progress of the tour, his flag shall be transferred to the first car overtaking him, which car shall thereafter become the pacemaker's car, subject to the same conditions, until such time as the official pacemaking car can again perform the duties. The car to which the pacemaker transfers may exchange a passenger for the pacemaker so as not to increase its normal load.

451. Referee in Contesting Car.—The Referee shall not ride in a contesting car except temporarily in case of the breaking down of his car, as described in Rule 450. In such case the temporary riding of the Referee in the contesting car shall not in any way modify or change the status of such contesting car or give it any privileges different from or greater than any other contesting car.

CONTROLS.—453. The official station established at the end of each day's run where the cars are officially checked, shall be known as the "night control."

The official stop for luncheon on each day's run (if there be one) where cars are checked in and out shall be known as the "noon control."

454. Each contestant shall be ready each morning to check out at the time announced. Checkers shall be at their stations at that time prepared to start the cars. The time of departure each day shall be entered on the Observer's card.

455. Each entrant, or official representative of such entrant, upon starting each day's run, shall sign a statement submitted by an official of the contest fixing the time of his departure, and shall be given a card indicating such time, which card shall bear the signature of said official. Failure to comply shall result in disqualification.

456. Controls and checking stations will be indicated by a flag with a white field and diagonal bar of red, which must be suspended at right angles to a pole, tree or building.

457. The Referee may establish inter-control checking points as he may deem proper. Each car shall be checked upon passing the established checking points, and if ahead of time at the noon or night controls may immediately check in.

458. No car will be checked either in or out without its observer and full passenger load.

459. There shall be established at the close of each day's run a parking station, in which all competing cars shall be stored. The station shall be in charge of an official representative of the Promoter's Technical Committee.

460. No work may be done on the cars while in the official garage or parking station, except lubrication during the 45 minutes allowed at the end of each day's run. (See Rule No. 424.)

461. Following the registration at each night control, each car shall be delivered into the custody of the officials of the tour at the official garage or parking station to be by them held at the owner's risk, and kept under direct charge and supervision of such officials or their agents until the time for starting on the following morning. Immediately after registration at night controls and before delivery to the official garage or parking station, the car may deliver the occupants (other than the driver and observer) and baggage at hotel and then must immediately proceed to the parking station. The observer must not leave the car until it is parked and the driver ready to leave also.

462. Passengers and baggage may be taken on at the parking station after the car has been delivered to the driver and observer but before checking out in the morning, or at the hotel after checking out when no time shall be allowed.

INTERMEDIATE CHECKING.—463. Inter-control checking stations shall be established in so far as may be necessary to stop speeding. Each driver shall receive a card when checking out in the morning which shall name the control stations and the time the car is due at each station, so that he may estimate his running time during the entire day.

There shall be no appeal from the time registered by the official watches; drivers and observers shall be required to rectify their watches each morning with the "official time."

464. Cars cannot check in ahead of time, except at the noon and night controls.

OFFICIAL FORM OF CHECKER'S SCHEDULE Reliability Tour for Trophy

(Date).....

Checker's Schedule.....day.....1911, Control at.....

No.	CAR	DRIVER	OBSERVER	Arrived	Dep'ted	Late
1						
2						
3						
4						
5						

Official Checker.

Remarks.

Car No.	

Official Checker.

OBSERVERS.—465. Each entrant shall furnish at his own expense one official observer for each car entered by him. All observers shall be acceptable to and subject to the instructions of the promoter.

466. The entrant must arrange for the care and keep of his drivers and observers and pay any expenses connected therewith. He must also carry during the contest the baggage of each observer furnished by him.

467. If the entrant is an automobile manufacturer or dealer, or in any way connected with the manufacture or sale of automobiles, each observer furnished by him shall be:

(a) A person who has been regularly and exclusively employed by the entrant by whom he is nominated for a period of not less than three months immediately prior to the contest, or

(b) The entrant himself or an officer or director of his business, or

(c) A dealer in the car made by the entrant, or

(d) An owner of a car made by the entrant.

468. If the entrant is not an automobile manufacturer or dealer, the observer furnished by him shall be satisfactory to the promoter.

469. Each observer shall be assigned to a car and shall ride each day in a different car and no person shall serve as an observer on any car in which he has any direct or indirect pecuniary interest.

470. Observers shall report each morning at the official garage or park one-half hour before the announced starting time for the day, and take charge of the cars to which they have been assigned.

471. Each observer will be responsible for the tools of each car, as per Rule 417.

472. Each observer must note the length of time in minutes and fractions of each stop made; if the motor is stopped or if any work is done, and also record what work was done on the car during the stop, how many persons were working, tools used and how many minutes each person was working. (See Rules 485 and 500B.)

474. The observer must see that the running card is stamped or marked by the checker at each control or checking station and that his car does not pass a control or checking station before the time marked upon the running card, except at the noon and night controls, and also note whether the route is followed.

475. The Referee shall be empowered to suspend any observer who neglects, is incompetent, or for any other reason fails to fulfill the duties assigned to him, and to provide a suitable substitute at the expense of the entrant by whom the suspended observer was nominated.

476. It shall be the duty of each observer under all conditions and without evasion of this rule for any reason whatsoever to remain with the car until he has been relieved by the Chief Observer or obtained the driver's signature to a statement that he has withdrawn from the contest and to report every detail of the performance of the car to which he is assigned, and all persons who operate, repair, assist or perform any action connected therewith.

477. If an official observer shall desert a disabled car without first obtaining the driver's signature to a statement that he has withdrawn from the contest, the entrant who appointed such observer shall be disqualified and must either withdraw from the contest altogether or continue as a non-contestant. By desertion is meant leaving the car without taking with him the driver and passengers. This rule will disqualify but one of the cars of an entrant in case of multiplicity of entries.

478. In addition to the surveillance of the cars in which they are riding, observers shall be required in so far as possible to make note of any other car which may be laid up alongside the road and whether the work being done upon it appears to be done on the tires or on the machinery and on what part of the car.

479. At the end of the day's run, the observer must remain with the car throughout the 45 minutes allowed the driver in which to oil his car (Rule 440), and when this is done, leave the car at the same time and in company with the driver—and deliver to the chairman of the Technical Committee, or his delegated representative, the "Running Card," after obtaining the signature of the driver upon said card and signing same himself. The driver shall in no case be permitted to return to a car without the observer.

480. Should any objection be made by the driver to the record, a report may be immediately made to the Chief Observer and by him it may be referred if necessary to the Referee for settlement. In the event of a dispute as to facts the Referee may require the driver to state his objection in writing. The record may also be inspected by any other properly authorized representative of the entrant, who shall also have a right to register an objection and submit proof in support thereof.

498. Oil or grease may be added to or may be drawn off the various cases when necessary without penalty during the forty-five minutes allowed for oiling at the end of each day's run. (Rule 424.)

499. Replacing of storage or dry batteries will be allowed at any time without penalty outside of controls.

TIRE ALLOWANCES.—See Rules 419-420.

MOTOR STOPS.—500. The following rules govern Motor Stops: All motor stops are penalized at one point per minute, except as stated hereunder:

(a) If a motor stalls and is started within one minute there shall be no penalty; for the time the motor is stopped in excess of the one minute a penalty of one point per minute or fraction thereof shall be imposed, no work being done.

(b) Motors may be stopped without penalty during the period occupied by repairs or replacements for which penalties are imposed.

(c) Motors must be kept running during tire repairs; if stopped during such tire repairs a penalty of one point per minute will be imposed during the period of stoppage.

(d) Motors may be stopped while gasoline and oil are taken on in controls or at points over 100 miles out of controls, where the distance between controls exceeds 100 miles.

(e) Motors may be stopped at controls or checking stations only after the car has been checked.

500A. The use by a contestant of any part or supply which may be carried by any other car accompanying the tour as a contestant or otherwise, or which constitutes a part of its make-up or equipment, shall cause the disqualification of the car.

500B. In recording time to be penalized the operator of the car and the observer must mutually agree as to the time when work commences, which shall be immediately recorded on the observer's card, and as to the time when such work ceases, which shall also be likewise immediately recorded.

NON-CONTESTANT.—501. Non-contesting cars must wear a sign or banner, approved by the referee, bearing the words "Non-Contestant" in letters four inches high on the sides and front, and such cars shall be subject to all the road rules and regulations of the contest.

501A. A car having withdrawn from the contest will be permitted to continue the run, but without the official numbers, and all banners and numbers must be surrendered to the Referee as soon as the car be withdrawn and the words "Non-Contestant" displayed, as provided in Rule 501.

FINAL OUTDOOR OPERATIVE TESTS.—502. The following tests are imperative at the completion of the contest, before the cars are washed, in Grades 1 and 2:

503. **Brake Test.**—The car under test approaches a line across the roadway at its competing speed in the contest, as set by an official pacing car, one set of brakes is applied and the distance measured in which the car comes to a stop. The other set of brakes are similarly tested.

A perfect brake stops the car in fifty (50) feet or under; a penalty of one point per foot or fraction thereof is imposed for distances above fifty (50) feet.

504. **Clutch Test.**—The front wheels of the car are rested against a vertical eight-inch curb, the low gear is engaged and the clutch let in. Failure to spin rear wheels, stall the motor or climb curb would be a bad clutch, for which a penalty of five points is imposed.

505. **Transmission Test.**—Car must be driven on all different forward speeds and reverse. Failure to drive on any one speed incurs a penalty of twenty-five (25) points.

506. **Motor Tests.**—(a) Gasoline cars, driving with open and closed throttle and advanced and normal spark to test firing. Penalty of five (5) points is imposed for each cylinder not firing.

(b) **Steam Cars.**—Test to see if motor runs with open and closed throttle; if valve slide action is operative; if running temperature and pressure of steam are possible; if engine simples or compounds; and note if various gauges and controls are operating properly. Penalties as per penalty schedule.

507. **Penalization of Accessories.**—Speedometers, odometers, lamps, horns, clocks, storm fronts, tops, baggage trunks, tire carriers and other accessories shall, at the option of the promoter, be penalized for work done upon them and for breaks and lost parts at final examination, which penalties WILL NOT COUNT AGAINST THE CAR, but against the accessories carried.

ROAD PENALTIES.—508. All cars shall start with a clean score.

Any car which for any reason discontinues as a contestant shall be penalized 1,000 points in addition to all previous penalizations.

A car which falls so far behind the contest that it fails to report at the night control within 12 hours of its official running schedule shall automatically withdraw as a contestant.

Where any portion of a car serves a dual purpose, one part being penalizable and the other non-penalizable, any work done or repair or replacement made on said part shall be penalized.

509. **Time.**—At all controls or checking stations a car is given a three-minute leeway. If due at a station at 10 o'clock, it has until 10.03 to arrive. The head checker must call aloud, or otherwise announce the time, so that waiting contestants can check through during their proper three-minute leeway.

510. Cars cannot check in ahead of the time marked on the running car, except at the noon and night controls, under penalty of disqualification.

511. After the expiration of the three-minute leeway each arrival shall be penalized one point for each minute or fraction thereof. (See Rule 451.)

512. **Work.**—In penalizing for work done on a car, by its driver or passengers, a penalty of one point per man per minute, or fraction thereof, shall be imposed.

512A. In penalizing for work done on tires while motor is not running, a penalty of one point per minute, or fraction thereof, shall be imposed.

513. **Penalty for Outside Work.**—Where work is done on a car by any one other than the driver or passengers, the penalty will be two (2) points per man per minute, or fraction thereof, for each of such outside persons.

514. **Work in Running Time.**—Work must not be done on a car between the time it leaves the official garage and crosses the starting line and between the time it crosses the finishing line and enters the garage at the end of the day's run.

Repair work cannot be done in the official garage.

515. **Replacement.**—(a) Where a replacement is made by the driver or passengers, the penalization is 2 points per man per minute or fraction thereof.

(b) Where a replacement is made by workmen other than the driver or passengers, the penalization is 4 points per man per minute or fraction thereof.

FINAL EXAMINATION PENALTY

516. At the close of the contest, each competing car, after being properly washed, shall be delivered to the Technical Committee, who shall record all adjustments, replacements or repairs which would be necessary to place each car in a safe and satisfactory condition, and penalties therefor shall be imposed in accordance with the following Fixed Penalty Schedule:

(Parts of cars not enumerated in the schedule, which are discovered to be faulty, impaired, lost or loose, shall be penalized in due proportion to those therein enumerated.)

FIXED PENALTY SCHEDULE

Lubrication.		Fan belt lost.....	2
Broken oil feed.....	3	Fan pulley broken flange...	25
Inoperative oil feed.....	3	Ignition.	
Leaky oil connection.....	1	Loose terminal.....	1
Loose oiler.....	3	Broken terminal.....	2
Disabled oiler.....	20	Dead battery.....	2
Lost grease cup.....	2	Lost commutator cover.....	2
Loose grease cup.....	1	Disabled commutator.....	20
Carburetion.		Inoperative ignition control.	5
Broken gasoline line.....	2	Disabled magneto.....	20
Leaky gasoline line.....	1	Loose magneto.....	4
Leaky gasoline tank.....	1	Ignition shaft loose.....	1
Leaky gasoline petcock....	1	Steering.	
Disabled throttle control...	15	Broken tie rod or drag link.	500
Broken or loose manifold...	15	Bent tie rod or drag link...	25
Brakes.		Broken steering rod.....	500
Broken operating devices...	100	Bent steering rod.....	25
Broken brake.....	100	Faulty steering gear.....	500
Loose operating devices...	20	Loose steering connections.	15
Bent reach rod.....	4	Broken steering knuckle....	500
Bent reach rod lever.....	2	Bent steering knuckle....	15
Running Gear.		Broken front axle.....	300
Broken spring leaves each..	5	Steering gear loose on frame	2
Broken spring clips each...	15	Steering column finishing	
Broken spring seating.....	15	plate on dash lost.....	2
Loose spring clip.....	1	Yoke pin loose.....	5
Loose spring horn.....	15	Yoke bearings loose.....	5
Broken frame side member.	500	Machinery Parts.	
Broken frame cross member	150	Broken valve.....	5
Bent frame pieces.....	75	Broken or impaired valve	
Broken strut rods.....	25	spring.....	2
Broken torsion rod.....	25	Broken cam.....	200
Lost muffler.....	5	Broken camshaft.....	200
Broken muffler.....	3	Broken crankshaft.....	200
Loose muffler.....	2	Bent crankshaft.....	250
Muffler cut-out wire broken	1	Broken valve rocker arm...	10
Muffler final exhaust loose..	1	Broken push or valve lift	
Muffler nut lost.....	1	arm.....	10
Muffler union loose.....	1	Broken transmission shaft...	100
Broken wheel.....	100	Broken cardan shaft.....	100
Loose wheel spoke.....	5	Broken driving chain.....	30
Broken wheel spoke.....	10	Broken gear or pinion.....	25
Wheel spindle loose.....	10	Broken bearings.....	10
Wheel bearing loose.....	5	Broken body or chassis bolts	2
Broken running board.....	5	Loose body or chassis bolts.	1
Broken fender iron.....	5	Lost body or chassis bolts..	2
Broken fender.....	5	Broken clutch.....	250
Loose fender.....	2	Broken or impaired uni-	
Fender screw lost.....	2	versal joint.....	50
Step bracket broken.....	5	Broken or lost bonnet fast-	
Step bracket nut lost.....	2	ener.....	2
Lost mud apron.....	5	Loose bonnet fasteners....	1
Broken mud apron.....	5	Broken or impaired sprags.	5
Broken rear axle.....	300	Broken shock absorbers....	5
Rear axle housing parted...	150	Loose shock absorbers.....	2
Spring strap lost.....	2	Engine hanger bolt broken.	2
Spring bracket bent.....	15	Engine bolt loose.....	2
Shackle bracket loose.....	2	Cylinder head plate leaking.	2
Bumper plate lost.....	2	Steam.	
Hub flange bolt broken.....	1	Leaky condenser.....	20
Cooling.		Leaky generator.....	50
Leaky water connection....	1	Faulty thermostat.....	20
Leaky radiator.....	20	Faulty pilot light.....	20
Loose radiator.....	4	Faulty flow motor.....	20
Disabled water pump.....	15	Faulty gauge.....	5
Inoperative fan.....	2	Steam leak in line.....	1
Leaky water jacket.....	50	Water leak in line.....	1
Fan belt off.....	1		

(In cases of leaky radiator or water jackets, recognition must be taken of the degree of leakage and the amount of fixed penalty modified accordingly.)

517. **Front and Rear Axles.**—No penalty shall be imposed when the spread between the two front or two rear wheels, measured at the ground, is one-fourth inch or less. When the spread exceeds one-fourth inch, the penalty shall be five points for each one-eighth inch or fraction thereof.

518. **Springs.**—A sag of one inch is permitted without penalty. For each additional one-half inch, or fraction thereof, five points.

519. **SUMMARY OF PENALTIES.**—Time—1 point per minute, or fraction thereof, late in arrival at any control or checking station.

Work.—1 point per man per minute, or fraction thereof, for labor by driver or passenger.

1 point per minute, or fraction thereof, for work on tires whilst motor is not running.

2 points per man per minute, or fraction thereof, for labor by workmen other than driver or passengers.

2 points per man per minute, or fraction thereof, for replacement of damaged parts by driver or passengers.

4 points per man per minute, or fraction thereof, for replacement by workmen other than driver or passengers.

3 points per occurrence for replenishing gasoline, oil or water, outside of fuel controls.

MOTOR STOPS.—1 point per minute, or fraction thereof, for motor stop when no work is done. No penalty for motor stop during period when work is being done on car, for which work or replacement a penalty is imposed. (See Rule 500.) 1 point per minute if motor is stopped during work on tires.

FINAL OUTDOOR OPERATIVE TESTS.—Brake Penalties.—50 feet perfect; for each foot, or fraction thereof, over this distance, 1 point. (See Rule 503.)

Clutch.—5 points for failure to climb curbs, spin rear wheels or stall motor. (See Rule 504.)

Gear Set.—25 points for failure to drive on any forward speed or reverse. (See Rule 505.)

Motor Test.—5 points for each cylinder not firing. (See Rule 506.)
Front and Rear Axles.—No penalty for one-fourth inch spread between wheels; 5 points for each additional one-eighth inch, or fraction thereof. (See Rule 517.)

Springs.—No penalty for sag of one inch; 5 points for each additional one-half inch, or fraction thereof. (See Rule 518.)

Final Examination Penalties per Fixed Penalty Schedule. (See Rule 516.)

AWARDS.—520. At the close of the contest and after receipt of the report from the Technical Committee of their final examination, the Referee shall post on the bulletin board at official headquarters (Rule 442) his decision as to the awards.

521. The awards shall consist of certificates, each setting forth in detail the performance of the car on the road and its condition upon the final examination.

522. Where trophies are competed for, the trophy in each class or division shall be awarded to the entrant whose car completes the contest with the least number of points to its debit.

NON-STOP RUN.—523. A run without an involuntary stop of the car outside of controls, except for tire trouble or on account of traffic congestion, shall be known as a non-stop run.

The motor must be kept running continuously while outside of controls.

The car may be brought to a standstill at any time, no work being done, and the motor kept running.

Stops for tire repairs or replacements with the motor kept running, are permissible.

Non-stop certificates may be issued to contesting cars in Grades 1 and 2 who conform to the requirements of the "Non-Stop" definition in a contest exceeding 1,000 miles in length.

PROTESTS AND DISQUALIFICATION.—524. A written protest may be filed with the Referee by any participant in the tour, but must be accompanied by the sum of twenty-five dollars. If the protest is not sustained, this sum will be forfeited to the Contest

Board; but if the protest is sustained the protest fee will be returned to the person making such deposit. No protest not conforming to the above requirements will be considered. Each protest will be acted upon at the earliest practicable moment.

(a) A protest relative to classification, validity of entry or pertaining to the course shall be made such time before the start of the contest as the Referee may determine and announce to competitors.

(b) A protest against any decision of the Technical Committee shall be made within three (3) hours after the decision is announced.

(c) Any protests as to unfair rulings, foul driving, routes, etc., shall be made within twelve (12) hours after the occurrence.

(d) Any other protests may be made during the tour or within twenty-four (24) hours after the tour is concluded and before any award is made.

525. No entrant or his official representative shall be disqualified until he shall have been notified of the act complained of, and if the act be denied, he shall be given a hearing, after which a decision shall be rendered. Upon notice of disqualification the Referee may compel him to cease to run in the contest and in that event the official numbers shall be removed from his car, and such entrant shall not receive any certificate, but shall be mentioned in the records as having been disqualified, and no entrant of any car that may be disqualified shall have any claim of any kind or nature whatsoever against the Promoter or against the American Automobile Association or any members of any committee or any official of the contest, because of such disqualification, or the publication thereof, or failure to mention the performance of the disqualified car prior to its disqualification.

526. Subject to General Rules.—Reliability contests shall be governed by the foregoing Special Rules, and on all points not specifically referred to therein shall be subject to the General Rules, Nos. 1 to 81.

New Stearns Establishment in New York

Stearns Company Takes Over Sale of Its Cars, This Work Having Been Done Heretofore by Wyckoff, Church & Partridge

A N NOUNCING in last week's issue of THE AUTOMOBILE the dissolution, by mutual consent, of the arrangement that heretofore obtained between the F. B. Stearns Company, of Cleveland, Ohio, maker of the well-known Stearns automobile, and Wyckoff, Church & Partridge, distributors in New York, no attempt was made to depict the preparation that the Stearns Company is undergoing for the handling of its product, and the taking care of its clientele, due to the fact that the new Stearns salesroom and service department was not sufficiently near completion to warrant the making of illustrations. The new Stearns establishment is located at Broadway and Fifty-seventh street, New York City, on the corner that was formerly occupied by the Hartford Rubber Works, and Fig. 1 shows the store with its expanse of plate glass, reaching for the whole length of the building along Fifty-seventh street, as well as upon the front facing Broadway. The interior of the store is shown in part in Fig. 2.

Plans are under way for a service department that will progress with the necessities, and means will be available whereby the users of Stearns cars will be afforded prompt relief as the occasion requires. The company points out that increased activity along progressive lines and direct responsibility are features in its new policy, and that the demand for Stearns automobiles is on such a broad and comprehensive basis that the new undertaking is justified.

The management of the metropolitan branch has been intrusted to W. Arthur Lesser, whose well-known ability will be backed by the skill and assistance of a competent staff, including Frank W. Post, Jr.; C. A. Ackerman, and T. Mackenzie Alexander. The final touches are being put upon the new establishment, and pressure is now sufficiently relieved so that Vice-President Roy F. York, and Treasurer Edward F. McEwen, and Advertising Manager Henry H. Hower are enabled to return to Cleveland and assume their respective posts of duty.



Fig. 1—Exterior view of the new Stearns headquarters at the corner of Broadway and Fifty-seventh Street, in the midst of "Automobile Row"

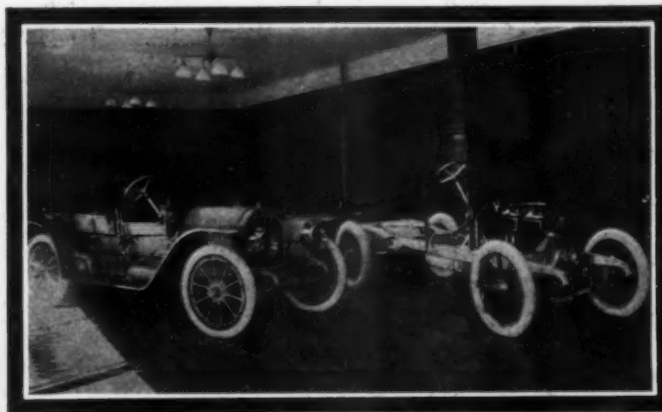


Fig. 3—Corner of the salesroom, showing two Stearns chassis, which were the first to arrive for display in the new establishment

Up From the South

Items of Automobile Interest From
the Section Below Mason & Dixon's
Line—Louisville Show a Huge Success

LOUISVILLE, Ky., March 20—Amid the blowing of siren horns and the ringing of electric bells, the fourth annual exhibition of the Louisville Automobile Dealers' Association passed into history Saturday night, bringing to a close the biggest and most successful show ever held south of the Mason and Dixon line.

The show held attention for four nights and three days, beginning Wednesday evening and lasting until Saturday, and was a fitting introduction to what is destined to be the best motor year for all concerned. It is estimated that not less than 20,000 persons visited the First Regiment Armory, said to cover more floor space than any other building south of the Ohio River, during the exhibition. And it is stated by visiting tradespeople, as well as local automobilists and dealers who have attended shows elsewhere, that the armory is one of the most suitable buildings in the country in which to hold a successful automobile show.

Fully 100 cars were sold, representing \$200,000. Each make of machine was shown in from one to seven different models. Every one of the 40 exhibitors, who had on display a total of 250 cars, aggregating in value \$350,000, expressed himself as more than well pleased with the results of the show. In the exhibits were exploited everything known to the automobile industry from the popular priced runabouts to the highest powered and most luxuriously appointed motor masterpieces.

So successful was the show from every point of view that Prince Wells, president of the Louisville Automobile Dealers' Association, has already requested reservation of the armory for the 1912 exhibition. Several of the dealers have already spoken for space next year.

Following is a list of the makes of cars exhibited at the Louisville Automobile Show: Autocar, Brush, Cadillac, Case, Chalmers, Cole, Columbia, E-M-F, Firestone-Columbus, Flanders, Franklin, Haynes, Hudson, Hupmobile, Interstate, Buick,

Kissel Kar, Krit, Locomobile, Marion, Marmon, Maxwell, Mitchell, Motorette, Oldsmobile, Overland, Packard, Peerless, Pierce Arrow, Premier, Rambler, Reo, Sampson, Stearns, Stevens-Duryea, Stoddard-Dayton, Studebaker, Velie, Winton Six, Speedwell.

Electrics:—Baker, Babcock, Columbus, Detroit, Fritchie, Hupp-Yeats, Rauch & Lang, Studebaker and Waverley.

Trucks:—Alden Sampson, Autocar, Frayer-Miller, Gramm, Hart-Kraft, Morgan, Packard, Rapid and Victor.

The only Louisville-made vehicle at the show was the Longest truck made in the shops of Longest Bros., of this city.

The automobile has been the most potent influence for good streets and improved highways the South has ever known. It has brought to Louisville an industry whose field is far-reaching. It was just about ten years ago that the first automobile—a rude buckboard affair—reached this city.

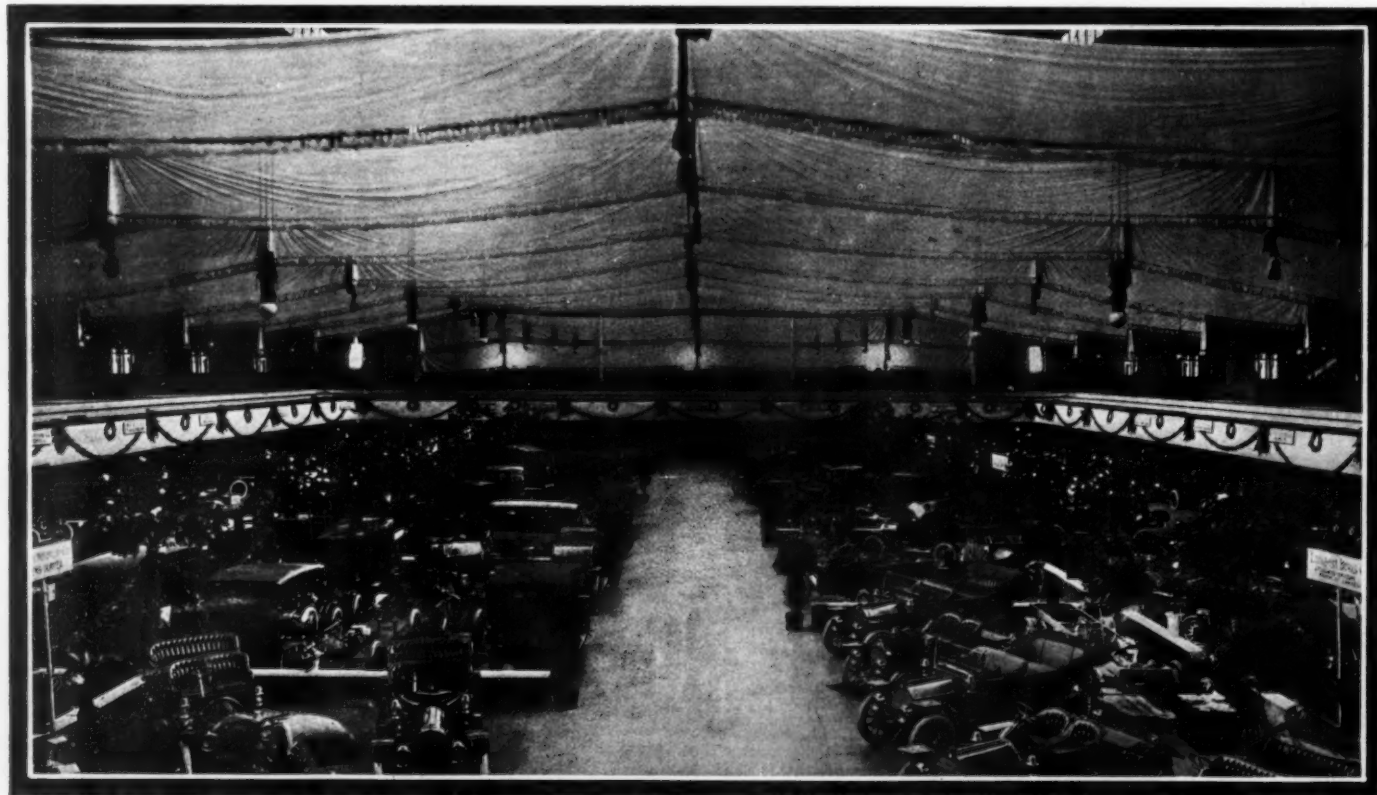
To-day about 1,300 cars, as fine a collection as could be found in any Southern city, are owned by Louisville residents, while throughout the State the motor car is fast supplanting the family driving horse, there being about 3,000 machines in Kentucky. Comparing the number of cars in Louisville this year with the number owned in March, 1910, an increase of 450 cars is shown.

A scheme of natural decorations was followed out. Magnolia trees—not artificial but real—were used in profusion, while imitation brick walls separated the exhibits. Smilax, evergreens, palms and other green things were used lavishly and the effect was that of a great park. The Imperial Band furnished the music.

Preceding the opening of the show a dinner was given at The Seelbach. Besides the members of the association, a number of city officials were present.

Prince Wells is president of the dealers' association; E. G. Reimers is vice-president and Philip Longest is secretary and treasurer. He succeeded Hubert Levy, who, after much hard work for the show, was compelled to take a vacation because of ill health.

While the Ford line was not represented at the show, the local representative, the Banks Motor Car Company, exhibited independently at its quarters at 437 South Second street.



VIEW OF FIRST REGIMENT ARMORY'S BIG DRILL HALL, WHERE LOUISVILLE AUTOMOBILE SHOW WAS HELD



GENERAL VIEW OF THE FIRST SHOW OF THE PITTSBURGH AUTOMOBILE SHOW ASSOCIATION (INC.)

Eastern News

Happenings of Importance in the Way of Shows, Trade Items, Etc., That Will Prove of Interest—Shows at Pittsburgh and Syracuse

The Pittsburgh Show Season Opens With the First Exhibition of the Local Show Association in the Huge Exposition Building—The Syracuse Show Was a Record-Breaker from Every Standpoint—Trade and Other News

Pittsburgh Show Season Opens

PITTSBURGH, PA., March 20—Unique in its arrangement and distinctly successful in the number and character of its exhibits is the first Exposition Automobile and Aeroplane Show, which opened at the Point Saturday night, March 18, under the auspices of the Pittsburgh Automobile Show Association, Incorporated. About 7,500 people passed through the turnstiles the opening night.

They were surprised and delighted with the beautiful interior of the great Exposition Building, for its magnificent color scheme of red, white and gold, its thousands of Elblight lights, hundreds of yards of natural vines, beautiful displays of potted plants and commodious palm garden rest rooms made a scene which surpassed in general attractiveness any automobile show ever seen in this city. High above the long line of automobiles hung the huge tire wheel, 12 feet in diameter, on each side of which was the painted reproduction of the automobile poster girl.

Great canvases 18 x 26 feet, on which were fine oil paintings, stretched around the walls of the immense show room, offered a novel and inspiring background for the motor cars. The effect of the decorations and show arrangement was decidedly pleasing and show experts who have visited all those events held so far this year pronounce the work of Manager Thomas Cochran and his associates, E. A. Williams, Elias Lang, Julian B. Howe, E. E. Gregg and J. H. McClaren, a success from every artistic standpoint.

The exhibits of cars at the Exposition Show are large and varied. In all, 56 makes are presented, a total of 159 models of pleasure cars and 22 models of trucks. These vehicles range in price all the way from \$450 to \$6,000. They are arranged in long aisles, the truck exhibit occupying the north side of the great building and the automobiles the center and the south side. The accessory exhibits, numbering 44, are ranged around the balcony and are easily reached by winding stairs leading up from the first floor.

The aisles are marked by high sign posts mounted upon pedestals consisting of columns of frosted white imitation granite, bearing cross arms of white and showing the names of the exhibitors in raised letters, which carry out the rich color scheme of the entire show, red, white and gold. All of the 65,000 square feet of floor space in Exposition Hall is taken and many applications were turned down. There is a motor boat exhibit at the east end of the hall.

Music for the entire show is furnished by Walter Blaufuss and his band of 38 pieces. Thursday night, March 23, has been set aside for classic or society night, when this band will render a strictly classic program. The show will close Saturday.

A complete list of the exhibits follows: Abbott, Alco, Auburn, Bergdoll, Brush, Clark, Correja, Crawford, Cutting, Detroit, E-M-F, Everitt, Flanders, Great Western, Halladay, Haynes, Hupmobile, Kline Kar, Knox, Lexington, Lion, Moon, Oakland, Ohio, Oldsmobile, Otto, Overland, Paige-Detroit, Penn "30," Rambler, Regal, Selden, Speedwell, Studebaker Electric, Studebaker "40," Thomas, Velie, Westcott.

Trucks:—Alco, Atterbury, Chase, Crown, Gramm, Kelly, Knox, Penn "30," Wilcox, Speedwell.

Accessories:—Air Tight Steel Tank Co., Pittsburgh Auto Lamp Repair Co., Mutual Wind Shield Co., The Square Deal Co., Duquesne Auto Parts Co., Electric Automobile Horn Co., Globe Garage & Auto School, Liberty Auto Tire & Supply Co., Hoover & Hurst, Pneumatic Tubeless Tire Filler Co., W. G. Bratton, Geo. W. Stephenson, Kent-Bell Company, Meyers Bros., Ben Starr, Hydraulic Oil Storage Co., Williams & Co., The H. W. Johns-Manville Co., Atlantic Refining Co., E. Edelman & Co., Petroleum Products Co., Pittsburgh Auto Equipment Co., Joseph Woodwell Co., Haynes Measuring Pump Co., Automobile Acces-

sories Co., Duquesne Auto Accessory Co., E. J. Thompson Co., Edward A. Weiland, H. A. Haymaker & Co., The Grady Manufacturing Co., Mutual Auto Accessories Co., Duquesne Cycle Co., Waverly Oil Works, Eyler & Henry, R. D. Nuttall Co., Union Electric Co., Star Speedometer Co., A. A. Marshall, W. B. Deshon, Cleaning Devices Co., Wm. Miller Sons & Co., L. E. Dare, Française Americaine Co., Walden-Dyott Co.

Show Stimulated at Syracuse

SYRACUSE, N. Y., March 20—The third annual automobile show given by The Automobile Dealers' Association of Syracuse at the State Armory in this city, which closed Saturday, was a record-breaker from every standpoint, and the manager, W. R. Marshall, and every member of the association, all of whom worked early and late for the good of the big show, may congratulate themselves upon giving what a number of visiting veterans were pleased to term the best show of the year, aside from the national events. It was an exhibition uniquely successful in the matter of decorations, entertainment, attendance and of sales. Moreover, the sales beat all records, and if signs count for anything, all former highwater marks of purchases of motor vehicles in Central New York will be exceeded during 1911.

Last year's show far exceeded the first in extent, and the one which closed to-day was fully 50 per cent. larger than that of 1910. The display of pleasure cars was a notable one, both in the number of vehicles shown and in the richness and general attractiveness of appointment. Among the makes not heretofore shown at a Syracuse show were the Moon, Paterson, Cutting, McIntyre, Moyer, Matheson, Baker Electric and Columbia, all on the main floor, while in the basement were seen the Overland, Lion, Case and Mitchell.

The show closed at 11 o'clock Saturday night with the simultaneous "honks" of all the automobiles grouped in the Armory. There were 6,000 in attendance, a record last-day crowd, which made a total attendance for the week of 30,000, establishing a new record.

Motor cars valued at over \$150,000 were sold during the week, and the sales of accessories amounted to \$25,000. The Syracuse makes of cars—Moyer, Franklin and Chase—had most satisfactory sales through the week. The accessories trade beat all previous records.

The cars which proved the most popular with the buying public during the show were those ranging in price from \$1,500

to \$2,500. However, the agents for high-priced cars report a successful week, while those who handle cars under \$1,500, especially under \$1,000, runabouts and small touring cars, were on the closing night congratulating themselves when they finished figuring the week's receipts.

The \$150,000 worth of cars mentioned represents more than 50 cars. Besides these actual sales there are many "prospects" lined up which the dealers expect to supply before the summer months roll around.

To Make Saurer Truck in Jersey

PLAINFIELD, N. J., March 20—The Saurer Motor Company, a recent incorporation formed to acquire the American rights to manufacture the Saurer truck, has perfected its organization and is preparing to start immediately to produce at its local plant.

The company is incorporated under New Jersey laws for \$1,600,000. The line to be made at the American factory includes three, five and seven-ton trucks.

C. Philip Coleman is president; Frank S. Richardson, treasurer, and Vernon Munroe, secretary. The directorate includes the above and William D. Sargent, Frederick H. Eaton, Charles H. Sabin, Otis H. Cutler, W. G. Pearce, Benjamin Strong, Jr.; Arthur H. Lockett, Hunter Marston and George B. Case.

A service department will be conducted in connection with the company.

Hyde Leaves Bosch Company

Harold Hyde, advertising manager of the Bosch Magneto Co. for the past two years, has severed his connection with that company and left for an extended fishing trip in the South.

Mr. Hyde has not announced his future plans as yet; but after enjoying a rest will undoubtedly again enter the field where he is well and favorably known.

Olds Works to Be Doubled

LANSING, MICH., March 20—For the purpose of doubling its capacity the Olds Motor Works will build an addition to its present plant, and surveyors are already on the ground. The building in contemplation is to have three stories and basement. It is to be 758 feet long by 74 feet in width. It will be an assembling area. Material such as machined parts, assembled frames and complete motors will be delivered to this building from the main machine shops and will pass through the various stages of assembling from one end to the other, where they will emerge as complete automobiles.

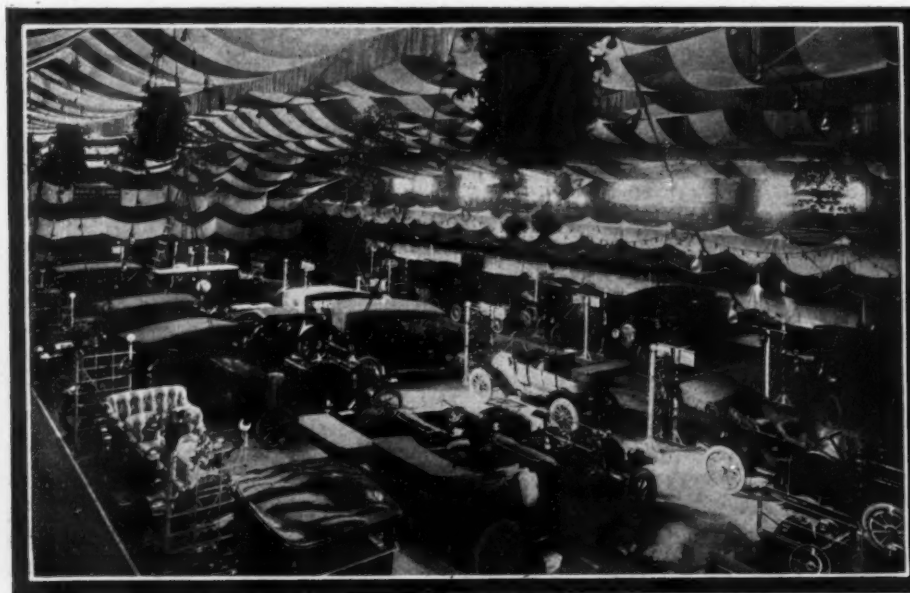
Special attention will be given to final inspection and a half-mile plank track will be utilized for final tests.

Fosdick to Stevens-Duryea

Harry Fosdick, well known in New York and the East as a sales representative, has been appointed general sales manager for the Stevens-Duryea Company at Chicopee Falls, Mass. Mr. Fosdick has handled the Winton and Fiat cars since 1899.

E-M-F to Have Spur

PORT HURON, MICH., March 13—The E-M-F Company is securing the right of way for a spur track of half a mile which the Grand Trunk Railway will lay to its factory.



General view of the interior of the State Armory, Syracuse, N. Y., during the recent automobile show

By Wire From the West

High Lights in the News From the Mississippi Valley and Beyond—Denver Show a Success

Buyers Flock to the Denver Exhibition—All Overland Cars to be Hereafter Built at Toledo—Velie Company Will Build Trucks—Fire Fails to Stop Haynes Company

Denver Show Draws Buying Crowds

DENVER, COLO., March 18—The annual Denver show, which was staged for five days in the Coliseum in this city, came to an end this evening after a most successful run. As is usual with these exhibitions, this, the fourth annual display of motor cars and accessories, was one of the largest of the year on the minor circuit, there being 75 different exhibitors this year as against 58 last year. Of these 34 displayed cars, whereas last year only 19 agents had space in the building. The show included more than 100 different motor vehicles.

All of the 22,000 square feet of space was taken, the main floor being devoted entirely to pleasure cars, while in the lobbies were located the commercial vehicles with one section set aside for motor cycles. The display of accessories was made in the boxes surrounding the main hall, there being 60 of these.

That this section of the Far West is interested in motor cars is shown by the attendance. Not only did the Denverites support the affair liberally but the country dealers and their farmer constituents came from towns within a radius of a couple of hundred miles, the result being that business was good throughout the week. Not only were many retail orders booked but Denver agents found it possible to place agencies in several towns where heretofore they had not been represented.

Tire Plant Almost Complete

AKRON, OHIO, March 20—The American Tire & Rubber Company, which broke ground here about three months ago, will complete its plant in about 10 days.

Overland Plant to Concentrate

TOLEDO, OHIO, March 20—Announcement has been made that the Indianapolis plant of the Willys-Overland Company will be removed to Toledo this spring. Indianapolis and Detroit parties have bought the Fifteenth street plant in Indianapolis, which has heretofore manufactured the motors for the cars assembled in that city, and will continue the manufacture of motors for other concerns, but all Overland motors will hereafter be made in Toledo.

The Drover street plant at West Indianapolis, which has been known as the Overland Automobile Company, will be devoted exclusively to the manufacture and assembling of Marion cars in new models.

In order to accommodate the addition, which will bring employment to about 1,700 more workmen, one of the largest individual factory buildings in the country will be erected at once. The structure will be 520 feet long, 100 feet wide, and three stories high, with basement under the entire building. The company is incorporated for \$6,000,000, and its output is about 15,000 cars annually. In a statement issued by the company Mr. Willys says that these changes are

brought about purely in line with economy; that, with the increased number of models required to supply agents with a complete line of cars, it is necessary to make shipments in mixed car loads, and some inconvenience has been experienced in having Overlands assembled at different places. It has, therefore, been decided to have the entire Overland business at Toledo, and the Marion business, which is an entirely separate organization, at Indianapolis.

Velie Company to Build Truck

MOLINE, ILL., March 20.—Within the present season a line of motor trucks is to be added to the output of the Velie Motor Vehicle Company. Materialization of a monster truck, after plans prepared by Chief Engineer Rose, is proceeding rapidly and before the end of the present week the model truck will be given a test on the Velie track. The actual weight of the Velie truck will be 8,000 pounds; its power will be 40 horse; it will carry between three and four tons. Though the price has not been definitely determined, the car will be placed on the market at about \$3,500.

The radiator has a capacity of 40 quarts, which is a little more than twice the size of the radiator on the Velie "Forty" pleasure car. This radiator is supported by springs to lessen the effects of rough travel. From radiator to jackshaft the truck embodies the same principles as the Velie "40" pleasure car, and the material used is somewhat similar.

Front wheels have solid rubber tires 5 inches wide, 36 inches in diameter. Each rear wheel has a dual tire, each section being 4 inches wide and 40 inches in diameter. These rear wheels weigh 560 pounds each. The first truck will be ready for delivery within the next three months. During the remainder of the season trucks will be turned out of the present factory in limited numbers, but indications are that in another season enlargement at the new engineering plant will make truck manufacture possible there.

Haynes Company Starts Building

KOKOMO, IND., March 20.—Work begins to-morrow on a big temporary structure which will be used as a manufacturing plant by the Haynes Automobile Company. It will be completed, according to present plans, in one week. Permanent buildings of steel and concrete, it is announced, will be begun as soon as the temporary structure is finished and will replace it section by section.



General view of the Coliseum at Des Moines, Iowa, during the Second Annual Show of the local Dealer's Association

"Taps" for Fire Horse

Test of Nott Fire Engine by New York Department Proves More Than Guaranteed and Arouses Much Enthusiasm for Modern Method of Property Protection

"TAPS" sounded for the fire horse in New York last Thursday when the new automobile fire engine, built by the Nott Fire Engine Company of Minneapolis, successfully passed through every requirement of the stiff test imposed by Fire Commissioner Rhinelanders Waldo, Chief Lally and his assistants.

The trial consisted of a speed run and pumping test and the engine made forty miles an hour and threw 753 gallons of water a minute, which was ten miles an hour and fifty-three gallons a minute more than the specifications called for.

It was a biting cold day with considerable snow on the ground and conditions otherwise were not the most favorable that might have been selected.

The machine cost the city \$9,772, but additional engines of the same kind will be furnished at \$6,000. Commissioner Waldo was sufficiently impressed with the test to make the announcement that the whole fire department will be equipped with automobile engines probably in from four to six years.

The argument in favor of the automobile engine as it is advanced from the records of the New York Fire Department are that it costs from \$700 to \$800 a year for shoeing and feeding the horse equipment of an engine, while the total cost of upkeep and operation of the automobile engine, as indicated in the cost bills of the trucks and hose-carts already installed, is from \$50 to \$100 a year, including gasoline and oil.

The Nott engine weighs 16,000 pounds. Its motor is rated at 110 horsepower. Only the motive power is derived from gasoline, as the pump itself is operated by steam.

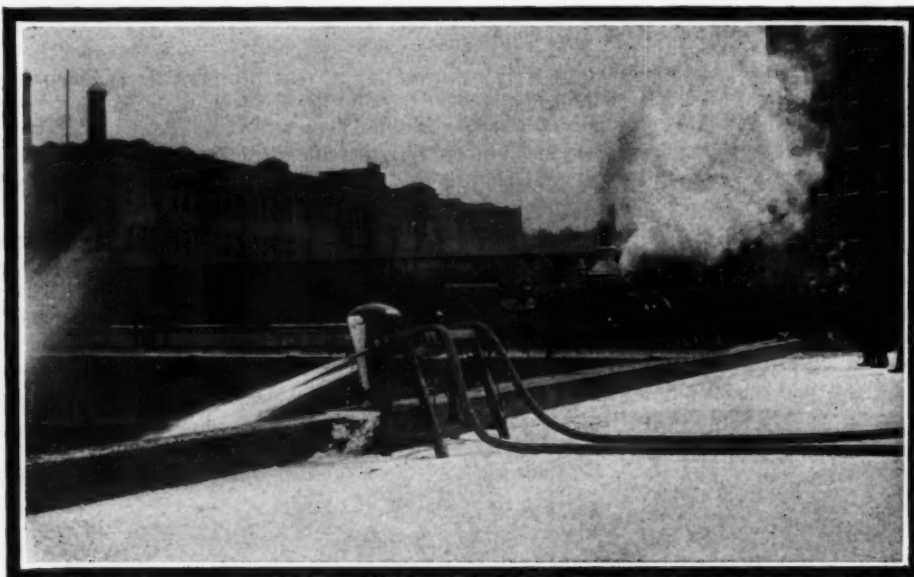


Fig. 2—Gasoline-propelled fire engine undergoing its tests for output capacity

There are now six automobiles in service in the fire department and four more are en route to this city. Twenty-eight other machines, mostly hose-carts, have been ordered.

The Nott engine will be known as Number 58 and has been stationed at 115th street and Madison avenue, a post that usually has about 1,000 fire alarms to answer each year.

An interested delegation of fire chiefs from various eastern cities witnessed the test.

The engine has answered several alarms during the week and on one occasion reached the scene of the blaze, quenched it and returned to the fire house in eleven minutes. It was on the ground several minutes before any of the other equipment, despite the fact that it had to travel considerably farther than the others.

A point that aroused keen interest among the officials was the actual money-saving from the operation of automobiles, in addition to speedier service when speed has an enormous value per minute. Fire automobiles only consume gasoline while in service going to or coming from fires and thus the amount of fuel used in the course of a full year makes a very small total.

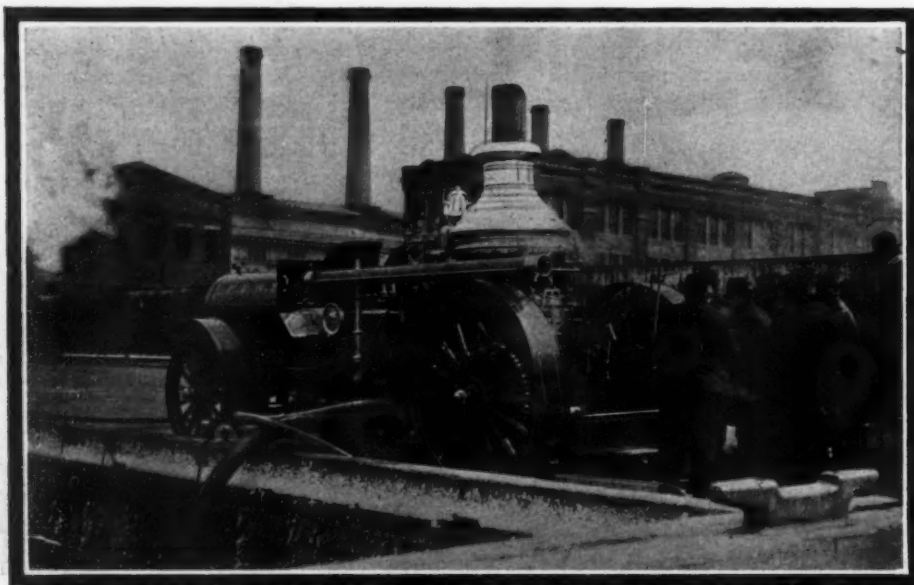


Fig. 1—The new fire engine recently added to the New York Fire Department equipment

Vienna's Fire Equipment

Fire Department Saves Considerably by the Use of Automobiles. The Number of Electrics Is Continuously Increasing

WHILE the first experiments with self-propelled fire equipment made by the city of Hanover in 1902 were not satisfactory, the experiences of the Vienna department were much in favor of the automobile as compared with horse-drawn wagons. At first there was considerable opposition to the introduction of the automobile in Vienna, and special stress was laid on the high first cost of the automobile by its opponents. But



Fig. 3—Couple-Gear tower wagon belonging to the New York Fire Department

the experience gathered during a few months taught the city fathers that in the long run self-propelled fire equipment pays for itself mainly by limiting the damage done by fire in a larger measure than horse-equipped engines could possibly do; and after the right class of fire equipment had been decided upon experience showed that the cost of maintenance of an automobile fire train is 40 per cent. less than that of a horse-propelled train, thereby making up to a great extent for the increased investment. Even the use of rubber tires does not increase the expenditures at a rate lessening the advantage offered by automobiles as compared with horse-drawn vehicles.

The Vienna fire department owns twenty automobiles, viz., two complete trains, each consisting of a hook-and-ladder wagon, a truck for the men of the force, a fire engine and a chemical engine; also six engines, three hook-and-ladder wagons, one more wagon for the firemen, a voiturette for the officers and a truck for reserve storage batteries. All the automobiles are of the electric type. Four or five automobiles are being added to this equipment every year, while no more horse-drawn vehicles are ordered at this time, this kind of equipment being entirely replaced by automobiles.

The first experiments were made with two electric trucks bought at a "bankruptcy" sale; one of the wagons was

changed over to a chemical wagon and the other to a truck for the men of the department. One year's work with these vehicles showed such satisfactory results that the city decided to install a number of electrics. The type which was selected is built by one of the Austrian automobile and body manufacturers, and is distinguished by its peculiar driving and steering system. The steering post is connected to the front axle at the center of the same. The batteries are stored above the front wheels and axle, which is thereby made to carry the bulk of the load. The motors take up but very little space, being located concentrically within the front wheels. Eighty-four cells, each having four positive and five negative plates, serve to store enough energy to propel the automobile over a distance of 31 miles at an hourly velocity of 12.5 miles. This is the third

speed, five of them being provided, with velocities ranging from 5 to 22 miles per hour. The weight of the batteries is 1,600 pounds, while the total weight of the automobile, including complete equipment and full number of men, is 9,000 pounds. Excepting the space taken by the batteries, all the room is left for motive power and the useful machinery.

The speed of these electrics is very high. On level ground and fifth (high) gear a velocity of more than twenty miles is obtained. The automobile equipped machinery is always in the lead when called out simultaneously with horses, and it has happened a good many times that the electrics, called out after the horses, reached the scene of the fire before the old-style equipment arrived there. The average time between the instant when the alarm is received and the moment when the autos leave the station is ten or twelve seconds, while the record is seven seconds.

As mentioned above, the maintenance of the automobiles of the fire department costs even less than that of horse-propelled vehicles. It cost \$4,394 a year to support a four-truck train drawn by horses, while an automobile train of equal size is maintained at a yearly expenditure of \$2,574. Thus the automobile service represents an annual saving of \$1,820, or 41 per cent., as against the cost of maintenance of a horse-drawn train.



Fig. 4—Power hose-wagon with nozzle for high-pressure water supply on Knox chassis

American Cars in England

How the Britishers Are Taking to Our Product, and What We Must Do If the Demand Is To Be Increased

IF automobiles would command a ready market in the United Kingdom, they must combine reliability, durability, noiseless running, smoothness and lightness. These virtues once established in an automobile to a degree that will inspire the prospective customer's confidence, the wedge may be said to have entered. But, in addition, the fact must be demonstrated beyond dispute that the automobile is cheaper to operate than the horse is to keep and drive and that the possession of the machine will insure a more prompt system of delivery.

The horseless vehicle has been a long time coming in England. It was many scores of years ago that a wise old lady prophesied that vehicles would go without horses. It was not until 1896 that commercial motor cars began to get any sort of a grip on the public in the United Kingdom. In that year the Light Locomotive Act went into effect. On account of the impracticability of the first models, little advance was made for a time. But the popularity of the motor car has grown until there were 15,191 trade vehicles registered in 1909. Under this act about 6,500 of these were wagons of three-tons (6,720 pounds) burden and over. There were 8,700 light delivery vans. The last-named were motor-propelled petrol (gasoline) machines. Steam has been used in most cases. A number of people claim that a driver can feed fire-boiler engines cheaper than it is possible to supply motors with gasoline. The lighter order of vans are almost entirely driven by the gasoline engine, thus doing away with the danger of sparks which a fire engine might inflict.

No American manufacturer should hesitate to go out after a share of the rapidly growing automobile trade in Great Britain; especially after having gone thoroughly over the field and noted

the tremendous increase in the demand for machines and the number in use. True it is that the automobile has not by any means succeeded in unfooting the horse in the United Kingdom—there are 600,000 horses in the city of London alone—but new machines, in batches and shoals, it would seem, are spinning in every day. The motor omnibus and the taxicab are responsible in a wide measure for putting the English public in the mood to do away with the horse in exchange for horseless vehicles. Even now it is no uncommon sight to see many of the larger business firms, especially drapers, brewers, builders, public carriers, house furnishers and grocers using horseless vehicles for delivery purposes exclusively. There are sanguine signs that a day will come when no horse-drawn vehicles will be seen either in London or in the hillless sections of Great Britain. The automobile has come to stay. Even that tremendously conservative old grandmother, the Post Office Department, as stiff and unbending as "The Old Lady of Threadneedle Street," has opened the door to the automobile. The department has established a permanent motor car service for transporting mails, the system involving a regular parcel post delivery to centers that are within a night's run. The service is proving reliable and popular, particularly between Leeds and Bradford, and between London and Brighton. Besides a great company down County Kent way has gone in for collecting and carrying fruits, market garden produce and cement by means of motor cars. The feasibility of the new venture is found in the dexterity with which these products in question are handled and trucked direct to the London market without the necessity of two extra handlings, namely, at the home and the terminal stations. The delivery vans average from 25 to 30 hundredweight (2,800 to 3,360 pounds), involving from 20 to 24 horsepower, and lighter vans, of 15 hundredweight (1,680 pounds), with 14 to 16 horsepower, the chassis of the latter vehicle selling for \$1,500. The cost of these motors varies from the last-named figure up to \$2,500, the price depending upon the horsepower and capacity.

Roads and Routes

United States Government's Office of Public Roads Taking Great Interest in a Practicable Transcontinental Route—One Traversing the South Is Here Shown

GOVERNMENT activity from the road-building point of view is at its height, and in order to be able to ascertain the conditions of the roads across the Continent, and to find out something of the necessities and the ramifications, the Office of Public Roads, under the direction of Dr. Logan Waller

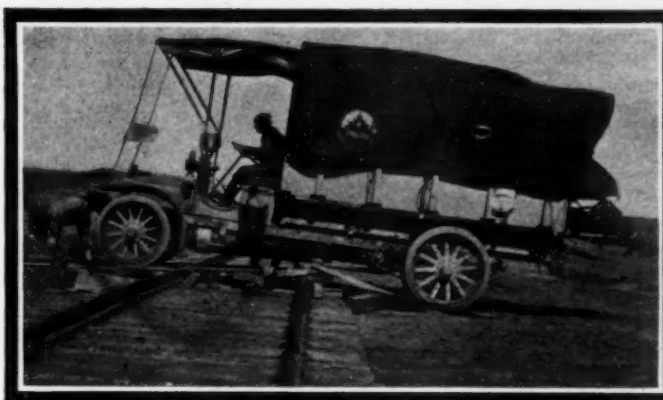
Page, is fathering a trip which is being made with a Saurer truck, under the direction of A. L. Westgard, who is instructed to make all reasonable headway, and whose progress has been such that he departed from Trinidad, New Mexico, on the thirteenth of this month en route for Raton, from whence he will go to Las Vegas,



Nearing the Rockies, north of Pueblo, with miles of sand ahead



In an arroyo, below Pueblo, among troublesome dry fords



Crossing a railroad near Huerfano, Col. The necessary lumber is carried on the car



Bridge across an irrigation ditch—it sagged perceptibly under its load

and thence to Santa Fe in his westward swing. The weight of the truck, which is augmented by a load of lumber, considering the variable road condition and many barriers, makes it impossible to maintain a fixed schedule, but, fortunately, the lumber is available for use in strengthening bridges and patching over bad spots so that good progress is being made under a severe set of conditions.

It is reported that the run from Denver proved to be particularly bad owing to the considerable stretches of wet adobe that had to be negotiated, together with some grades reaching as high as 20 per cent. and at three distinct places along the trail bridges had to be made, and in some of the bad sandy places a corduroy construction was resorted to. The truck weighs 14,000 pounds and the wheels broke through two of the bridges en route. One of the strange situations encountered was in connection with the flimsy culverts that road-builders bestow upon a willing public. The truck entirely destroyed one of these wooden culverts, and its progress was threatened on several occasions, due to the lack of stability of the work done on the devices of this kind. It will be understood, of course, that these incidents retarded the progress of the truck, and endangered its construction under such conditions.

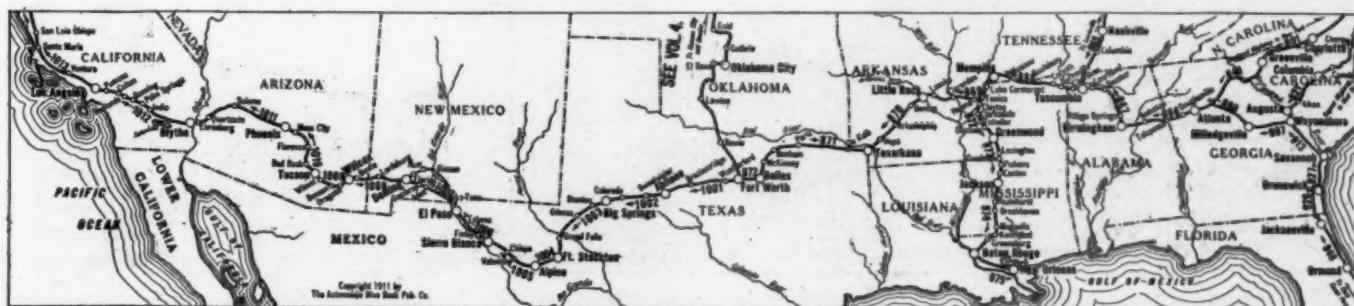
Near Walsenburg progress was interrupted due to a terrific sand storm, which is not an uncommon phenomenon in this part of the country. It was impossible to see 50 feet ahead, and the terrific bombardment set up by the little missiles as they smarted the skin was even more uncomfortable than the dust which the storm persisted in throwing in the eyes of the driver. South of Walsenburg a blizzard was encountered, so that the trip is being made under conditions which represent fully the average expectation in this part of the world. Upon arrival at Huerfano Creek the conditions were found to be too risky, owing to the presence of quicksand in the ford, and the course was altered a matter of 20 miles to a point where a gravel bottom offered a safe passage. In relating these little incidents of this trip overland, it offers an opportunity to point out that there is a marvelous possibility in the building of good roads, and that the fullest realization of the good that must result will surely follow in the

footpath of effort such as this, since it will permit of taking action of the kind that will be based upon experience and result in permanent good.

Southern Route, Atlanta to Los Angeles

Including a Map Showing the Best All-the-Year-Round Tourists' Route Across the Continent

PERSISTENT demand for touring information, particularly of the class that will assist the venturesome automobilist to cross the continent under pleasurable conditions during periods of inclement weather, is having its effect. The touring map as here presented was placed at the disposal of THE AUTOMOBILE through the courtesy of the Automobile Blue Book Publishing Company. The route depicted on this map is the one that was taken by G. W. Finney, who drove an Ohio car from Atlanta to Los Angeles, and the understanding is that the forthcoming Volume 3 of the *Automobile Blue Book* will afford complete and detailed data of this way across the continent. For the present, the tourists who are in need of information of this character have the option of reaching Atlanta from any point on the Atlanta seaboard over the various well-known *Blue Book* routes, and the transcontinental map here given indicates the western course, taking departure at Atlanta, thence to Birmingham, passing on in the northwesterly direction to Tusculumbia. It is a direct route from this place to Memphis, Little Rock, Texarkana, Dallas and Fort Worth. From Fort Worth the line of travel follows the Texas & Pacific Railway over a gradually rising plateau, touching the Rio Grande River at El Paso, Tex. From this point New Mexico is traversed, and cutting the Southern part of Arizona, passes through Wilcox, Tucson, Phoenix and crossing the Colorado River at a point near the Needles. The southern part of California is traversed, taking in a part of the Mojave Desert, finally reaching the rich valley district, ending at Los Angeles.



Map of a new Southern transcontinental route, with Atlanta, Ga., as a starting point. (Numbers refer to routes in Vol. 3, *Automobile Blue Book*)

Regarding Rubber Some Timely and Important Revelations Gathered From Various Sections of the World Where It Is Produced

FOUR of the oldest rubber plantation companies in the British Colonies produced during the fiscal year ending in December, 1910, rubber to the amount of 2,313,717 pounds, divided amongst the following colonies: Linggi, 874,000 pounds; cost of production, 24 cents per pound. Anglo-Malay, 666,251 pounds; costing 21 cents. Selangor, 450,403 pounds; costing 26 cents. Pataling, 323,953 pounds; costing 20 cents per pound. On the Kula Lumpur Estate there are 14-year old trees averaging 10.418 pounds per tree; at Parit Buntur, 15-year-old trees are giving an average annual yield of 27 pounds; while a few old Ceylon trees are yielding 55 pounds each annually.

During the year 1910 crude rubber exported from Para, Iquitos, Manaus and Itacoatiara, in the Amazon District, amounted to 37,596.5 metric tons, of which 14,614.3 metric tons was shipped to the United States and 22,614.3 metric tons to Europe. The grades of rubber, together with the amounts, are shown in the following figures. Exported to the United States: Fine, 7,303.8 metric tons; medium, 1,363.7 metric tons; coarse, 4,319.7 metric tons; Caucho, 1,627.1 metric tons. Exported to Europe: Fine, 11,656.7 metric tons; medium, 1,811.3 metric tons; coarse, 3,364.6 metric tons; Caucho, 6,149.6 metric tons. In 1909 the amount shipped to the United States reached 19,841.4 metric tons, while that exported to Europe totaled 19,829.6 metric tons, making a grand total in 1909 of 39,671, or an increase over 1910 of 2,074.6 metric tons.

Raw jelatong (Malaysian) rubber, which in the Spring of 1910 was quoted at 11 cents the pound, was, according to the latest statistics available, quoted at 7.9 and 10 cents the pound. One company operating in the Federated Malay States has been granted the sole right to tap jelatong trees and collect the latex of these trees, their accession including an area of almost 5,000,000 acres. The licensed servants of the concessionaires each bear a zinc label. They will be allowed to tap jelatong trees on the mammoth premises during the coming ten years. After these ten years shall have expired the concessionaires will be granted another seven years' lease of the forests, unless notice of dissatisfaction on the part of either party to the agreement is given six months in advance of the expiration of the contract. The concessionaires agree to employ 1,500 servants to do the tapping by the first quarter of the second year. No tree having a girth of less than 4½ feet shall be tapped, and all work of this sort must pass the satisfactory inspection of the Forest Conservator. The felling of trees is absolutely forbidden; nor must the wood of the trunk be cut in the tapping. In fine, the "ringbone" system of tapping, such as is observed on the other Malaysian and in the Bartica (British Guiana) rubber plantations, must be followed. A royalty of 47 cents for every 133⅓ pounds of latex collected must be paid, as well as an export duty of 10 per cent. The revenue during the first seven years must not aggregate less

than \$5,700, while there must be a revenue of \$57,000 during the last three years of the contract. The concessionaires are building an extensive factory on Kerimum Island, in the Straits of Malacca. The mill is installed with up-to-date machinery, most of which is American made. A large portion of the jelatong rubber gathered in Malaysia is worked over in two tremendous mills, one of which is located on Kerimum Island and the other in Sarawak, Borneo. The product is shipped to the United States and Europe as rubber. In price the product ranges from 25 to 30 per cent. lower than the Para rubber produced in Malaysia.

Hyatt Roller Bearings

Showing How These Roller Bearings Are Applied to Axles and Transmission Systems

ANTI-FRICTION bearings of the various generic types have come into automobile construction as one of the permanent features, and of these generic types of bearings the Hyatt roller bearing, as manufactured by the Hyatt Roller Bearing Company of Detroit, Mich., is well known. This bearing comprises a flexible roller and an inner and outer raceway with means for maintaining alignment and provision for lubricating in conjunction with closures which will prevent foreign substances from entering the region of the bearing and serving as an abrasive.

These roller bearings are made in various sizes with a view to distinctive service under the several practical conditions, and they offer advantages in several ways, among which will be mentioned the use of long bearings, if space in the radial plane is limited, or if the reverse holds, the bearings are made of large diameter with shortened rollers. The quality of the material employed in the respective types of bearings conforms to the several needs, ranging from special grades of nickel steel for the rollers in exacting service to selective grades of carbon steel for them when this class of material is looked upon as fitting in view of the imposed conditions. The raceways, likewise, are of selected materials, preferably of steel which will lend itself in the hardening process, this being a desired property in view of the need, since it is proper to have the surfaces of extreme hardness, and capable of taking on a high polish, but since this hardness is obtained at the expense of dynamic ability it is desirable to so treat the parts that they will retain a relatively soft and accentuated kinetic condition.

This bearing, being flexible, is regarded as peculiarly fitting in live rear axle work and for propeller shafts, it being the case that perfect alignment is difficult to maintain in shaft members; moreover, the jackshafts, if they are of the floating type, are rarely ever so centered that they will rotate perfectly on the true axis, and the life of these units is prolonged to whatever extent flexibility may be induced if this desired property is not at the expense of flexure of members that are not designed for or capable of thriving under such conditions. It would seem,

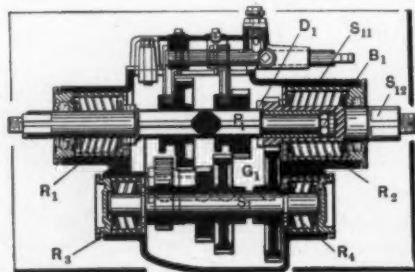


Fig. 1—Section of a three-speed selective transmission gear, showing the application of Hyatt roller bearings

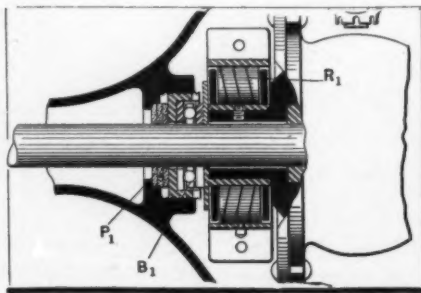


Fig. 2—Section of propeller shaft, showing application of Hyatt roller bearings for radial loads, and ball thrust bearings for bevel thrust work

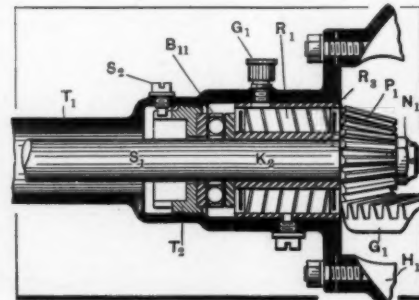


Fig. 3—Section of a rear axle, showing the jackshaft mounted on a Hyatt roller bearing and the end thrust taken by a ball-thrust bearing

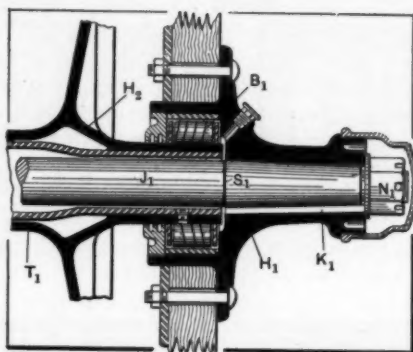


Fig. 4—Section of a live rear axle, showing the use of a Hyatt roller bearing and a closure to keep out foreign substances.

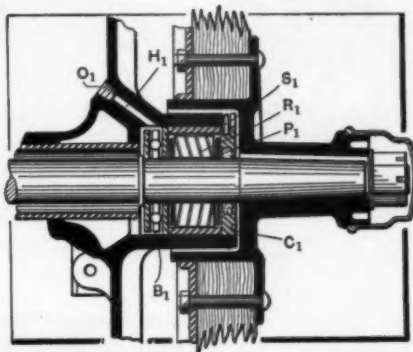


Fig. 5—Section of a live rear axle, showing the use of a Hyatt roller bearing in combination with a ball-thrust bearing taking radial and endwise loading.

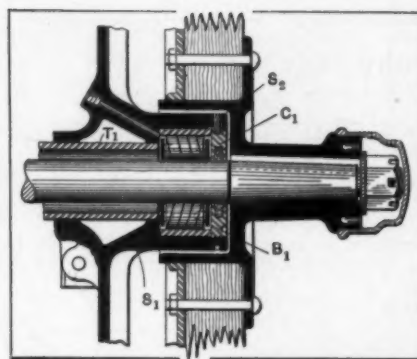


Fig. 6—Section of a live rear axle, presenting a variation in the method of application of high-duty Hyatt roller bearings.

under the circumstances, as if the wide extent to which this type of bearing is being used is an earned tribute to a theory that is not in conflict with practice.

No Limit Placed On Use of This Type of Bearing

Granting that these bearings were introduced in connection with live rear axle work, it remains to be said that they are also employed extensively in transmission gears, an illustration of which is shown in Fig. 1, presenting a three-speed selective type of transmission gear sectioned in the vertical plane, showing the prime shaft P1 of the square type for the sliding gears, mounted on roller bearings, R1 and R2, and a lay-shaft, S1, mounted on roller bearings, R3 and R4. This gear is designed for direct drive on high with dogs, D1, which engage mates on the gear, G1; an end thrust is taken by a nest of balls, B1, at the end of the reduced portion of the prime shaft, P1, and a bronze sleeve, S11, is interposed between the stub shaft, S12, and the reduced portion of the prime shaft, P1. This transmission gear is of convenient size and easy to manufacture; moreover, the small diameter of the bearings lends facility to the designer's plan of maintaining the minimum of weight without infringing upon the proper measure of strength.

Another example of this type of bearing is shown in Fig. 2, presenting a section through the housing of the propeller shaft at the junction of the differential housing, bringing into view the propeller shaft, S1, on the end of which the driving pinion, P1, is pressed up on a taper and held in place by a castellated nut, N1. The pinion, P1, meshes with the bevel gear, G1, and is enclosed by the differential housing, H1. The torsion tube, T1, is concentric with the propeller shaft, S1, and at its terminus it is enlarged to accommodate the roller bearing, R1, which is provided with an inner race, R2, and an outer race, R3, but thrust loads are taken by the thrust bearing, B1, which is held in place by the takeup, T2, and this member is adjusted by screwing it in and out against the thrust bearing, and after adjustment locking is accomplished by means of the set screw, S2. Grease is pressed into the roller bearing by the grease cup, G11. The arrangement is compact and substantial.

Still another application of this type of bearing is shown in Fig. 3. In this case, however, the rollers, R1, are short and of increased diameter, the idea being to maintain a minimum distance of the overall length. Thrust is taken by the thrust ball bearing, G1, and foreign substances are kept out by the packing, P1.



Referring to Fig. 4 of a live rear axle, a high duty type of this make of bearing, B1, is in the plane of the spokes of the wheel as they are clamped to the hub, H1, and the jackshaft, J1, has a shoulder, S1, against which the hub presses in response to pressure exerted by the nut, N1, the shaft being tapered so that when the hub is pressed onto the shaft it is held with great firmness, but a key, K1, is also employed as a safety measure. The axle tube, T1, is reduced in diameter, and the housing, H2, fits over the tube, serving as the inner race for the roller

bearing. This is a compact and substantial design of axle shown.

Fig. 5 differs from Fig. 4 since in addition to the high duty roller bearing, R1, a thrust ball bearing, B1, is utilized to relieve the radial bearing of its endwise responsibility. In this case also foreign substances are kept away from the bearing by the closure, C1, which is locked after it is screwed into place by the snap ring, S1, and felt packing, P1, is planted in the groove. The bearings are lubricated through the oil hole, H1, from a grease cup that is screwed into the orifice, O1.

Referring to Fig. 6 it will be observed that this type of axle differs from Fig. 4 in that the closure, C1, is at the outside, otherwise the high duty ball bearing, B1, is required to do the work in the absence of a thrust bearing. In this case also it will be observed that the axle tube, T1, is of the same diameter throughout, and that the roller bearing has its outer raceway fitting in the spider, S1. A snap-ring, S2, locks the closure member in place after it is screwed up against the outer race, the latter being held in place due to the clamping.

The sizes of these bearings have been standardized, and they interchange with other makes of bearings, and for the convenience of automobile engineers, the company has issued a very comprehensive catalogue of its products, with tabulations, giving the essential dimensions for the information of engineers and draftsmen, with a further assurance to them that housings may be designed within the limits of tolerance established, and the bearings, when they are procured for the purpose, will go into place without urging.


Quality Must Be Duplicated In Replacing a Broken Part—Size Is Not the Only Consideration


REPLACING a broken part does not consist in merely duplicating the part from the size point of view. The materials must be duplicated as well, or better yet, since the displaced part showed lack of staying qualities, to use a better grade of material in the new one would be more to the point. On the other hand, to use a greater section of the same, or an inferior grade of materials, would not be a justifiable procedure for several reasons, among which the question of the increase in weight is one never to be lost sight of. If a car is made of inferior materials, the question of the quality of the materials to use in the repair of the same is still an important matter, since the prevention of future rupture of the same parts would be the important matter. It is the repair man who can remedy such matters, because it is to the repair man the car will go in quest of balm for its wounds. It is the repair man who should alleviate the distress of the suffering autoist. If the automobilist is accorded no more than further license to put up with additional interruptions of service at additional cost, 'tis not a repair at all.

Prominent Accessories

Devices That Are Made For
the Convenience of Owners of
Automobiles

ACCESORIES, such as are not necessary to the running of an automobile, find a place on the car due to the desire of the owner, and they may be of necessity, for convenience, or to bestow appearance. At all events, this phase of the automobile industry is well cared for, and the following are some of the devices that the market affords.

LISTED among the warning signals that are available to automobilists the "Newtone" shown in Fig. 3 is being manufactured by the Automobile Supply Manufacturing Company, of Brooklyn, N. Y., and it is delivered complete to the automobilist, including the push-button and cable as shown. This warning signal is of the motor type, in which the motor is enclosed in the cylindrical portion back of the flange; the diaphragm is housed in by the flange portion, and the megaphone is fastened at the

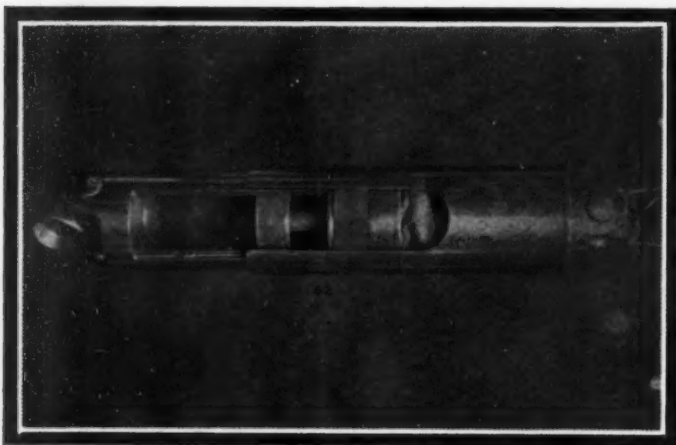


Fig. 1—Kilgore shock absorber working on the air-cushion principle, with part of cylinder cut away to show the working parts

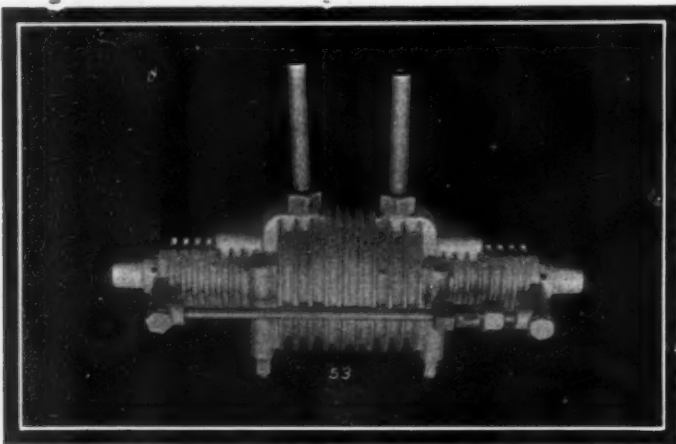


Fig. 2—General view of the Bi-plex power tire pump, which utilizes the force of the explosion stroke to impart power to the pump piston

flanging. The holding bracket extends out from the underside of the flanging, and it is so designed with a crow-foot extremity as to accommodate itself to any fastening point on a car, as the dashboard. The motor is wound to operate either from four dry cells or three cells of storage battery, and it is the claim of the maker that the draft on the battery is not in excess of two amperes of current. In the construction of this equipment care has been taken to make the same dust and waterproof. The sound emitted from this device is of the musical order.

These instruments are finished in brass, black enamel or nickel plated.

REFERRING to the tire-pump as shown in Fig. 2, by opening the cocks in the valve plugs after attaching the rubber hose connection to the tire, the gas from the engine is admitted to the pump and starts it in action. The explosions will act on opposite sides of the piston, causing it to oscillate back and forth in step with the engine. At each end there is a valve that allows air to be sucked into the cylinder and closes on the return stroke, allowing the compressed air to pass through to the tire.

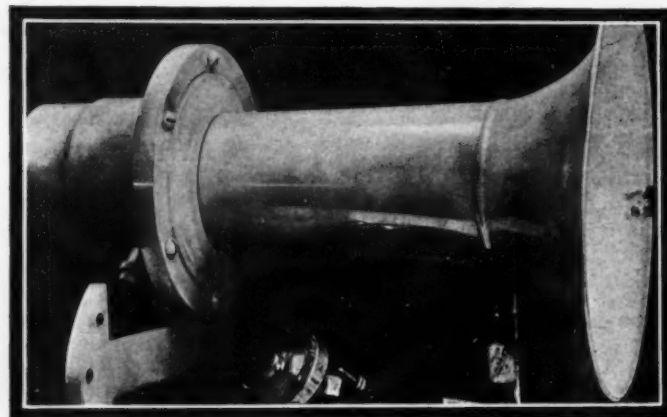


Fig. 3—Motor-driven Newtone warning signal designed to operate on dry cells

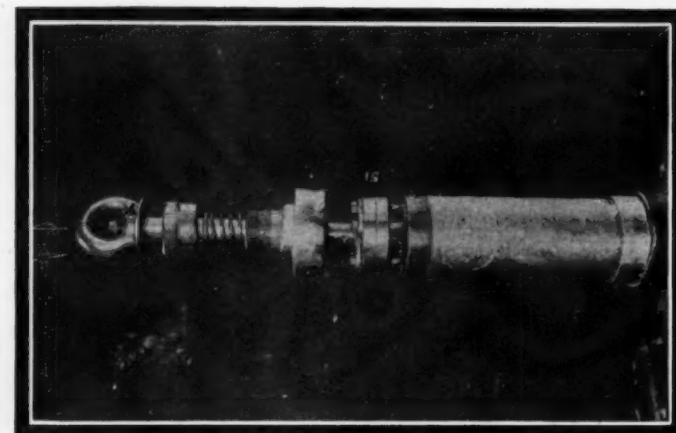


Fig. 4—Flentje shock absorber working on the hydraulic principle, showing the piston removed from the cylinder

The pump is made by the Motor Specialties Company, Motor Mart, Boston, Mass.

AMONG shock absorbers, Fig. 4 shows the Flentje which is of the kind approximating a dash-pot, utilizing glycerine as the snubbing liquid. The shell is of light but strong construction and is swiveled to the car at one end while the other member, composing the piston and rod, fastens to the car and reciprocates as motion is imparted to the body as the automobile makes headway on the road. The vertical bounce of the body is regulated due to the retarding influence of the glycerine which has to pass through apertures in the plunger or piston in the shell.

VARIETY, as the spice of life, has nothing to do with this property as it is depicted in the making of automobiles. There are a number of ways of solving every problem, and the way the Kilgore Manufacturing Company, of Boston, Mass., solved the shock absorber problem, is shown in Fig. 1. In this example compressed air is used in a cylinder and a piston of suitable construction is caused to reciprocate in a cylinder due to the relative motion of the body.